The OIL AND GAS JOURNAL

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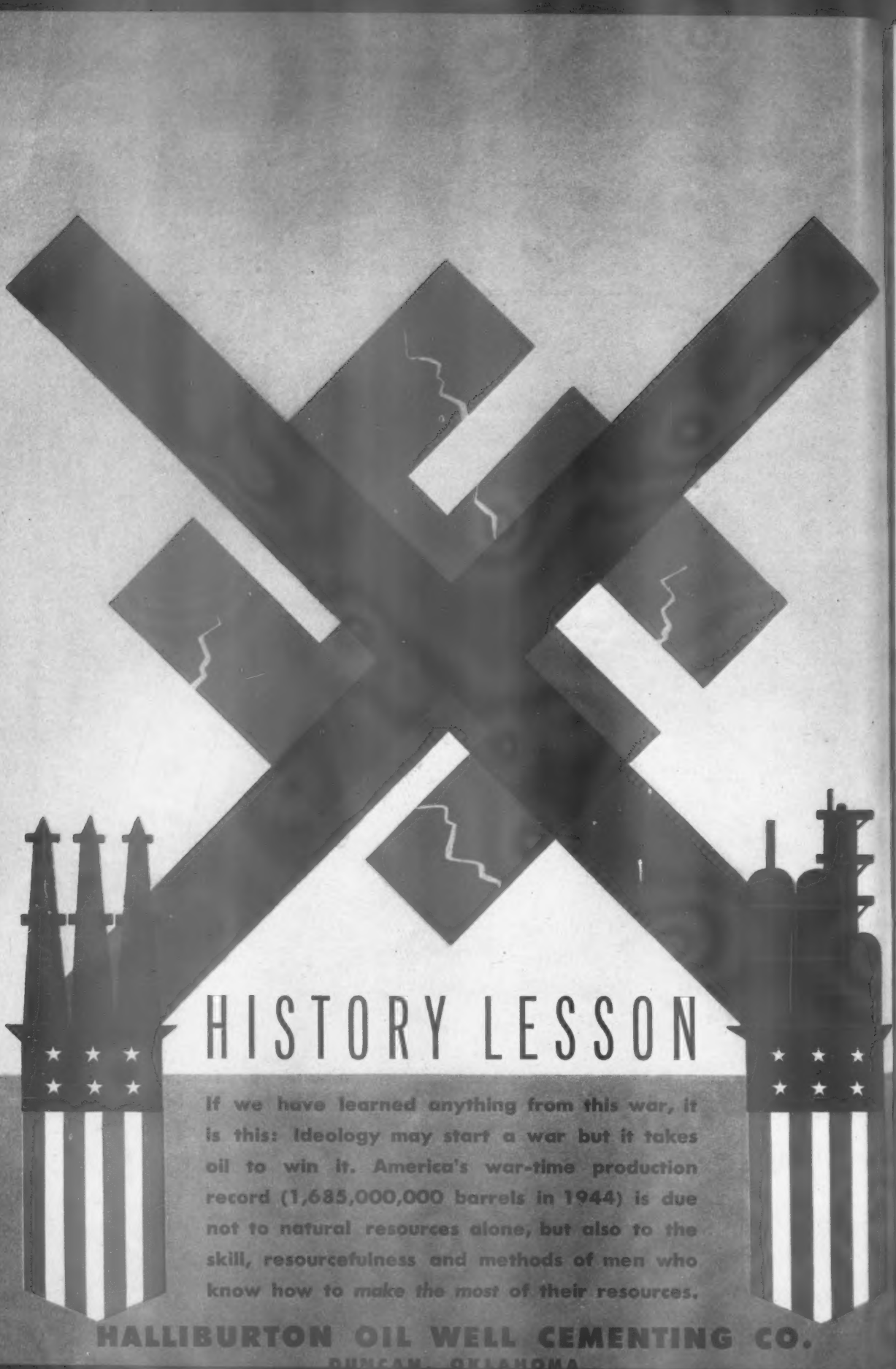
HISTORY LESSON
If we have learned anything from this war, it is this: Ideology may start a war but it takes oil to win it. America's war-time production record (1,685,000,000 barrels in 1944) is due not to natural resources alone, but also to the skill, resourcefulness and methods of men who know how to make the most of their resources.
HALLIBURTON OIL WELL CEMENTING CO.
DUNCAN, OKLAHOMA

the OIL AND GAS JOURNAL

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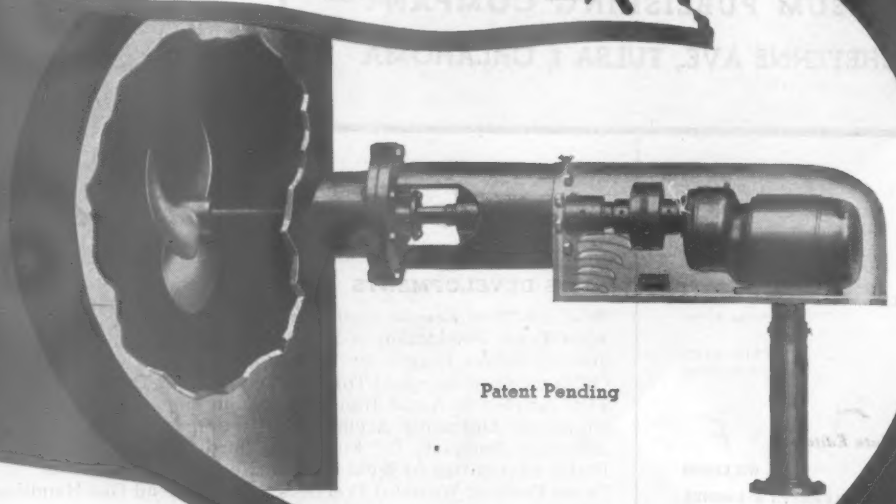
PORTER

Side-Entering MIXER



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ARMY NAVY

PORTER Better Built Equipment Established 1866

H. K. PORTER COMPANY, Inc.

PITTSBURGH 22, PENNSYLVANIA

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 168

CRUDE-OIL STOCKS 221,024,000 bbl. as of April 14—up 153,000 bbl. One year ago 234,188,000 bbl.

GASOLINE STOCKS 97,410,000 bbl. as of April 14—down 605,000 bbl. One year ago 87,761,000 bbl.

RESIDUAL FUEL-OIL STOCKS 41,538,000 bbl. as of April 14—up 218,000 bbl. One year ago 52,146,000 bbl.

GAS OIL AND DISTILLATE STOCKS 27,886,000 bbl. as of April 14—up 849,000 bbl. One year ago 30,072,000 bbl.

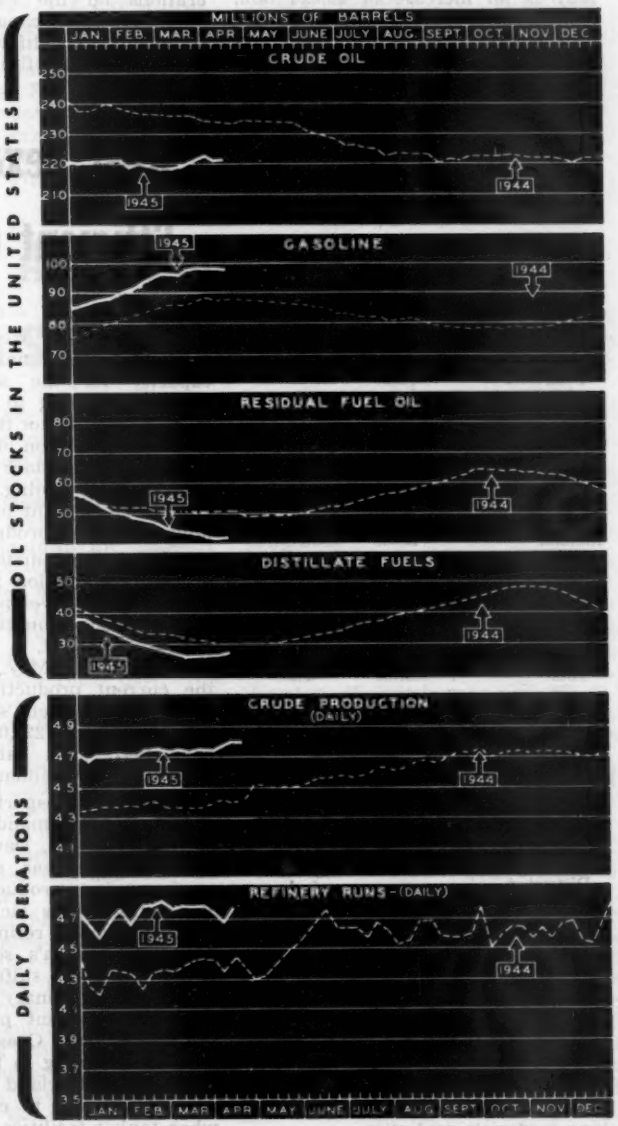
CRUDE OIL PRODUCTION 4,793,750 bbl. as of April 21—down 8,050 bbl. One year ago 4,425,400 bbl.

REFINERY RUNS 4,770,000 bbl. daily week ended April 14—up 84,000 bbl. One year ago 4,494,000 bbl.

IN December 1941 crude-oil production in California averaged 632,000 bbl. daily. Petroleum Administration for War has asked the state to produce 947,000 bbl. next month, an increase of 50 per cent since Pearl Harbor. In addition it is scheduled to manufacture 60,820 bbl. daily of natural gasoline and related products, making a record total of 1,007,280 bbl. daily of liquid petroleum for the state. The percentage expansion in California field output exceeds that of any other major oil state and in volume is second only to Texas. The crude oil output of the two states in May, based on projected operation, will be 955,000 bbl. daily greater than it was during the month which marked the entry of this country into the war. The gain offsets 231,500 bbl. daily decline in the rest of the United States resulting in an overall national expansion of 723,500 bbl. daily over a period of 41 war months.

THE war has brought greater changes in California production and distribution than in any other area. In 1941 the production of its fields and refineries exceeded the domestic requirements of the three West Coast states and parts of the Rocky Mountain areas adjoining. During part of 1941 its exports—principally to other sections of the Western Hemisphere and the Pacific area—exceeded 50,000 bbl. daily. Gasoline was still being shipped to the East Coast in late 1941.

SINCE the start of 1942 many of the prewar operations in California have been reversed and others greatly enlarged. Despite steady increase in field and plant output, the California supplies have not been sufficient to meet military and civilian requirements. Most of its prewar outlets in nearby countries of this hemisphere have been lost to other suppliers. Substantial quantities of crude oil and products are being imported into California for processing and for reshipment to military areas. In doing everything that it could do in supplying war markets from its own resources its stocks of crude oil and heavy fuels have been reduced. Government reports reveal that from May 1941 to January this year inventories of crude oil in California were reduced from 36,151,000 bbl. to 20,270,000, while stocks of residual fuels were decreased from 55,015,000 bbl. to 23,779,000.



New All-Time-Record Production Rate of 5,198,480 Bbl. Certified

WASHINGTON.—Another all-time record production rate of 5,198,480 bbl. daily of all petroleum liquids was certified here last week by the Petroleum Administration for War, projecting required operational levels for May.

The swing of war emphasis to the Pacific theater was obvious in assignment of quotas. For the first time in history, California is called upon for daily production exceeding 1,000,000 bbl. The daily quota of 1,007,280 bbl. of all petroleum liquids assigned to California in May is an increase of 29,920 bbl., compared to April. Crude oil requirements from California next month averaging 947,000 bbl. daily is an increase of 28,200 bbl. and is 23,400 bbl. per day above the maximum efficient rate of production.

Sixty-seven restricted pools in California will supply the increased supply of crude oil. Pools in the San Joaquin Valley were assigned 14,645 bbl. of the increase. Coastal district areas were raised 7,245 bbl. and the Los Angeles Basin area was raised 8,370 bbl. Individual fields assigned the largest increases include Buena Vista Hills, 5,750 bbl.; Coalinga Nose, 2,600; Santa Maria Valley, 2,500; Ventura Avenue, 1,370; Wilmington, 5,075 and the Jones sand pool at Huntington Beach, 1,600 bbl. daily.

Purpose behind the increased production quota assigned to PAW District 5 was to increase refinery operations on the Pacific Coast to maximum plant capacity. Petroleum shipments to California from other producing and refining districts, including substantial volumes of crude and Naval diesel fuel, currently average 120,000 bbl. daily. Additional overland movement is being arranged.

Thus, magnitude of the task confronting the petroleum industry, particularly the West Coast contingent, in providing the military requirements for the concentrated offensive against Japan is spelled out in terms of barrels of crude-oil production and refinery operations. Tanker transportation, terminal and storage facilities at advance bases must be coordinated with rising production quotas. The number of tankers transferrable from the Atlantic when V-E day is declared will be more than offset by the greater distances to be covered in the Pacific.

Other production increases were assigned by PAW to Districts 3 and 4 with moderate recessions in Districts 1 and 2. Estimated natural gasoline and condensate production is 331,980 bbl. daily, an increase of 2,820 bbl. over the April forecast.

PAW PRODUCTION RATES IN BARRELS PER DAY

	May 1945	
District 1—	Certified total petroleum liquids	Estimated natural gasoline and condensate
New York	13,000	....
Pennsylvania	40,000	1,000
West Virginia	13,200	5,000
Total	66,200	6,000
District 2—		
Illinois	217,000	12,000
Indiana	13,000	....
Kansas	278,200	4,200
Kentucky	33,200	2,200
Michigan	47,700	700
Nebraska	1,000	....
Ohio	7,600	600
Oklahoma	396,000	28,500
Total	993,700	48,200
District 3—		
Alabama	300	....
Arkansas	85,200	5,200
Louisiana	402,000	42,000
Mississippi	53,000	....
New Mexico	109,800	4,800
Texas	2,332,000	162,000*
Total	2,982,300	214,000
District 4—		
Colorado	10,500	....
Montana	23,300	300
Wyoming	115,200	3,200
Total	149,000	3,500
District 5—		
California	1,007,280	60,280†
Total U. S.	5,198,480	331,980

*Includes 16,000 bbl. per day separator condensate over and above anticipated plant production. †Includes 5,200 B/D Paloma condensate production.

West Texas Production at Maximum Efficient Capacity for Second Month

WASHINGTON. — Crude-oil production from West Texas fields in May will be at maximum efficient capacity for the second straight month, according to Deputy Petroleum Administrator Ralph K. Davies. With the exception of a small quantity of excess black-oil productive capacity in Wyoming, this is the last area to be brought under full maximum efficient production.

The latest estimate of maximum efficient production from the West Texas area, developed by PAW's District 3 subcommittee on reserves and development, is 480,000 bbl. of crude daily for May. This is about the current production level. Production has risen slowly from a daily average of 229,000 bbl. in January 1941, to a daily average of 478,000 bbl. in January 1945.

Expanded transportation facilities and increased demand has made the increase possible, Davies explained. Earlier in the war, chief deterrent to increasing production in West Texas fields was lack of adequate transportation to refineries equipped to run the area's sour crude oil, which is high in sulfur content and corrosive to ordinary iron surfaces. Normal movement prewar was to the Texas Gulf Coast for refining there or shipping to the East Coast by tanker. Overland transportation was insufficient to carry the load when tanker facilities were reduced.

New facilities approved by PAW have been provided to transport West Texas crude to refineries in PAW Districts 1, 2 and 3. These included: Stanolind Pipe Line Co.'s 16-in. pipe line from Slaughter, Tex., to Drumright, Okla.; Magnolia Pipe Line Co.'s 12-in. pipe line from Midland to Corsicana, Tex.; Gulf Refining Co.'s improved facilities between Judkins and Ranger, Tex.

Additional facilities are provided by the government-owned Southwest Emergency Pipe Line, running from Refugio to Houston, Tex. This transports Southwest and West Texas crude fed into it from the Humble and other pipe lines. At Houston, West Texas crude is delivered to Pan American and Shell pipe lines for movement to Longview, and thence to eastern refineries through the Big-Inch line.

About 20,000 bbl. daily are now moving by tank cars to Pacific Coast refineries. Some West Texas production is now moving by tank car to Pittsburgh, where it is placed in the Keystone pipe line for delivery to Philadelphia.

PAW has also vigorously urged refineries to blend West Texas crude with sweet crude, to make possible better utilization. PAW also approved the allocation of alloy steel to various refineries desiring to equip themselves to handle this production, Davies said.

Journal Editor Leaves For Pacific War Theater

ENORMITY of the job of supplying and distributing millions of barrels of petroleum products to Allied forces converging on Japan for the war's finale will be described for Journal readers. Henry D. Ralph, the Journal's Washington editor, has turned war correspondent for this special assignment. His observations at forward supply bases in the Pacific theater of military operations will be written to the fullest extent commensurate with security restrictions.

Ralph left Washington April 19 aboard a Navy plane for a swing

through Allied positions in the western Pacific. Stops were scheduled at San Francisco, Pearl Harbor, Guam, Saipan, Tinian, Einewetok and possibly the Solomons and Manila.

Painstaking attention to detail and keen ability to cut through superficial exteriors, reaching the core of a story with the least expenditure of words, are among Ralph's accomplishments which will make his dispatches of outstanding interest to Journal readers.

Navy May Get $1,120,000 for Alaskan Oil Operations

WASHINGTON.—The House Appropriation committee last week recommended that $1,120,000 be included in the 1946 Navy appropriations bill for further exploration in Petroleum Reserve 4, in Alaska. $1,050,000 was granted for the purpose during the fiscal year 1945.

Total 1946 funds approved by the committee for the operation and conservation of naval petroleum reserves was $1,185,000.

Oil Equipment Assigned Top Spot In Post V-E Day Allocations

WASHINGTON.—Oil industry equipment will get top priority on materials after V-E day, it was learned here this week. With a few other "most essential" industries, oil producers will have first call on materials released by cutbacks and revocation or suspension of War Production Board control orders.

Exact amounts of steel and other critical materials to be channeled into the petroleum industry will not be revealed until V-E day. Plans for the over-all pattern of reconversion are now being developed by WPB's top committee, the Committee on Period One. V-E day will be the signal for their release, but it is now thought that the time may be determined in one of two ways. First on General Eisenhower's official announcement that resistance has ceased in Germany. Second, on a "production V-E day" determined in Washington. The latter eventuality is being considered seriously, in view of the extended fighting in Germany. It would be a date chosen arbitrarily on the basis of war demands, but the effect upon materials would be the same as an announcement from Eisenhower.

Meanwhile, James Small, CPO chairman, has let it be known that the petroleum industry advisory committee will be called in to discuss specific plans for allocating materials to the industry. Only such plans as relate directly to the oil industry will be revealed to the industry group.

Third quarter steel allocations are being worked out as usual, without consideration of changes to be made at the end of the European phase of the war. The Petroleum Administration for War is this week completing its materials requirements for submission to War Production Board.

FOC Alerted to Assist Handling Of Oil Supplies for Civilian Europe

WASHINGTON.—The Foreign Operations Committee of the oil industry was called upon this week to be prepared to assist in handling petroleum supplies for civilian Europe when the United Nations' military forces relinquish the responsibility. The task will last as long as wartime product and transportation shortages exist, Deputy Petroleum Administrator Ralph K. Davies said.

Orville Harden, chairman of the committee, New York City, was asked by Davies to revise the responsibilities of the industry's European petroleum committee, a subcommittee of FOC, to provide for its active participation in supplying European areas with petroleum supplies as soon as the military situation permits. Until now, the European committee has had only advisory function.

Davies asked that additional members be appointed and that the committee be called the European Petroleum Supply Committee. PAW will designate the European areas in which the committee will operate.

The groups will deal with crude petroleum and petroleum products of all kinds, except as otherwise provided by the director of PAW's foreign supply and distribution division, Davies said. The committee will also be asked to compile data on authorized supply programs and to help arrange for transportation of products in accordance with such programs.

Present membership of the European committee is composed of J. P. Berkin, M. J. A. Bertin, L. K. Blood, H. T. Dodge, H. G. Denham, H. A. Hassen, and A. M. Wylie, all of New York; H. I. Castel and B. P. Newton of Pittsburgh, and W. R. Marshall of Philadelphia.

German's Gasoline Output Is Slashed 96 Per Cent

WASHINGTON.—Germany's gasoline production has been slashed to only 4 per cent of the normal rate, according to a high official of the Army Air Forces. German production capacity for steel, rubber, trucks, tanks and virtually all other war materials has been reduced also to a "mere trickle," the official said.

The "absolute chaos" into which German production has been thrown was brought about by capture of enemy industrial centers.

Oklahoma Operators Acclaim Unitization Law as Forward Step

OKLAHOMA CITY. — The Oklahoma unitization law, signed last week by Gov. Robert S. Kerr, is being acclaimed by all classes of operators as one of the most constructive steps yet taken in petroleum legislation. Oklahoma operators with holdings in other oil states already have recommended the unitization law to contemporary legislatures.

Only meager preliminary work has been started on the requisite of gaining 50 per cent of the operating interests in various fields in support of applications for unitization. The law provides that operators owning 50 per cent of the productive acreage in a fully developed area may petition for unit operation of their holdings. The Corporation Commission is obliged to consider unitization applications. If conditions are found in conformance with the law, unit operation may be ordered. Minority interests representing a minimum of 15 per cent of the acreage in the proposed area may block unitization if protests are filed within 60 days after the commission's order is issued.

The law does not become effective until the middle of July because the majority by which the measure passed the house was not sufficient to attach the emergency clause. Consequently, operators will have nearly 3 months in which to perfect petitions for presentation to the Corporation Commission. The measure does not apply to fields in which the discovery well has been completed 20 years or more. The field age limitation was substituted in final consideration of the bill for an earlier restriction which prohibited application to fields producing above a stipulated depth.

Sponsors of the bill which permits collaboration of operating interests in pressure-maintenance, secondary-recovery and cycling operations are seeking first application to ideally situated fields such as East Watchorn where only about 22 wells and 800 proven acres are involved or to Apache where 150 to 200 wells are producing in an area covering 700 acres.

Eventually, of course, the unitization law will be applied to West Edmond and probably Oklahoma City, assuming that the minimum acreage is committed to the application. West Edmond, operators feel, is in gravest need of pressure-maintenance consideration. Newness of the field, relatively low initial pressures and comparatively rapid declines present all the conditions which the Oklahoma unitization law is designed to minimize.

Materials Adequate for Fulfilling Third-Quarter Completion Program

THE oil industry was assured this week that materials will be adequate for fulfilling the third quarter program. This assurance was given in Tulsa April 24 by C. P. Parsons, Washington, director of materials for the Petroleum Administration for War who was visiting the oil country to review the equipment situation for operators.

The industry, Parsons told operators, must supply 50,000 tons of tubular goods from inventory during the third quarter in order to accomplish the completion objectives. He announced that inventory questionnaires returned to PAW by 88 per cent of the industry disclosed tubular stocks totaled 445,000 tons on March 1 and that total requirements for the third quarter would be 328,000 tons.

Domestic operations will consume 299,000 tons of oil country tubular goods in the third quarter and the PAW foreign program calls for 29,000 tons.

The industry will receive approximately 278,000 tons of tubular goods of domestic steel mills, representing all but 22,000 tons of maximum capacity which is earmarked for the Army rocket and bomb program. Originally, Parsons disclosed, the Army rocket and bomb program in the third quarter called for 52,000 tons of tubular steel. Arrangements have been made and approved by War Production Board whereby the petroleum industry will withdraw 50,000 tons of its total third quarter tubular requirements from inventory and the Army will give up 30,000 tons of steel previously intended for rockets and bombs.

For the first time since the war started, the petroleum industry's quota of 278,000 tons of mill capacity will be controlled through a space directive, meaning that nothing short of a major emergency can displace oil country tubular goods schedules.

Parsons revealed that current production of tool joints is at the rate of 43,000 per month, compared with 25,000 monthly a year ago. He said that drilling rig production is adequate to meet the completion program and that drilling engines are available in sufficient quantity to accomplish the well schedule.

Rodgers Confirms Plans For Arabian Pipe Line

The proposed pipe line to transport crude oil from the Persian Gulf to a port on the eastern Mediterranean will probably be built within the next few years, according to W. S. S. Rodgers, chairman of the board of The Texas Co. At the annual stockholders meeting held in New York, he announced that the surveying of possible routes and preliminary work in procuring rights-of-way is going on, and that he believes the project is sound economically.

"Rationing of petroleum products," Texaco's board chairman continued, "will undoubtedly continue throughout the war. It is our opinion that at the end of the European war, motorists should receive some increase in ration, but we doubt that it will exceed 25 per cent more than they are getting now."

The Japanese war, he pointed out, will probably use relatively more petroleum products than have been used in the European phase of the war because of the greater distances involved. Most of the tank vessels in service will be required to transport petroleum products not only from the Pacific Coast, but also from ports on the Gulf of Mexico and in South America.

Concerning the difference of opinion in the petroleum industry as to whether the United States will have an abundant supply of its own crude oil in the years to come, or whether diminishing crude resources will cause this country to seek a supply beyond its border, Rodgers cited prominent authorities as saying that the United States, with about 15 per cent of the oil-bearing formations in the world, has been producing about 60 to 65 per cent of the world's petroleum for many years.

"We cannot expect to continue this trend indefinitely," he said. "In our opinion, there is no real cause for alarm provided this country is willing to become a substantial importer of oil. We believe the world's crude-oil reserves are entirely adequate for many years to come."

THIS WEEK

PRODUCTION—Another record output of 5,198,480 bbl. daily certified to producing states for May. . . . California assignment exceeds 1,000,000 bbl. daily for first time in state's history. . . . Emphasis apparent on swing of supply weight to Pacific military bases. . . . Southwest and Rocky Mountains asked for more production. . . . Quotas reduced slightly in Districts 1 and 2. . . . ¶Natural gasoline and condensate expected to account for 331,980 bbl. daily next month, up 2,820 from April estimate. . . . ¶Maximum efficient rates of production exceeded in several states by May quotas. . . . ¶West Texas Permian basin now producing at m.e.r., including tank-car shipments to California and Pittsburgh. . . .

EQUIPMENT—Oil country material to receive top priority when end of European war permits cutback. . . . Changes are nearer than some realize but translation into casing, engines, drill pipe takes time. . . . ¶Operators urged to exercise same foresight in projecting material requirements. . . . ¶There will be bulges and tight spots in material supplies until Japan is defeated—just as in the past 3 years—to compensate for unforeseeable war changes, miscalculations and ordinary mistakes. . . .

INTERNATIONAL—Venezuelan production continues upward climb. . . . ¶Plans disclosed for resumption of drilling in Kuwait. . . . ¶Foreign Operating Committee asked to assist in restoring civilian oil supplies in liberated Europe. . . . Committee expected to prepare schedules, arrange for supplies, keep check on general flow of crude and products. . . .

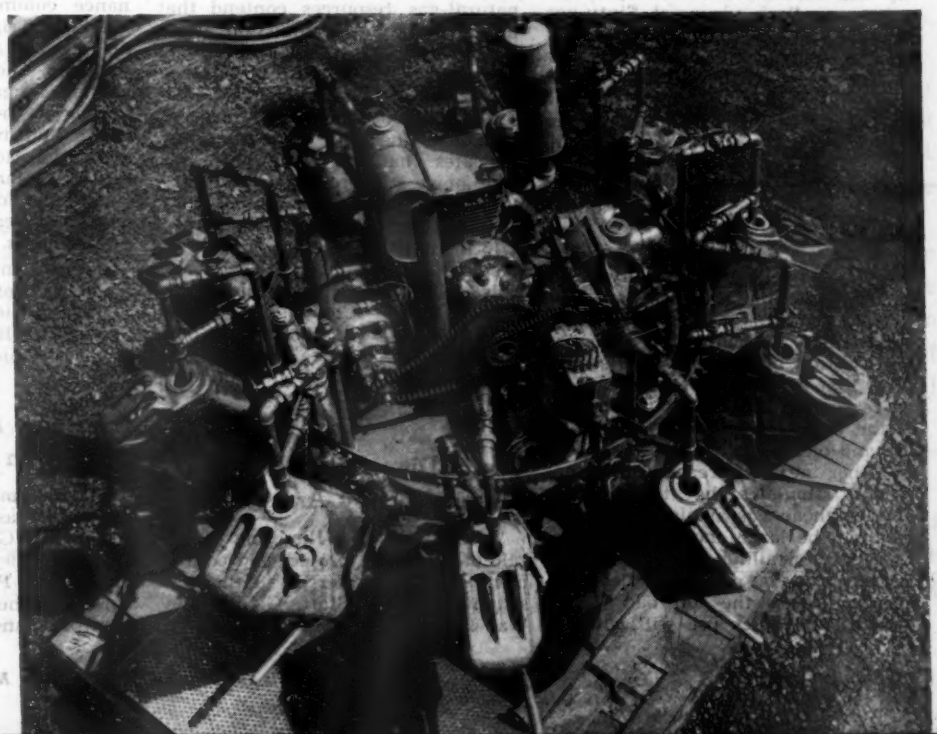
LEGISLATION—Congressional clarification may be sought to establish antitrust immunity for participants in Anglo-American agreement. . . . Justice Department refuses "curbstone" opinion on whether cooperating firms would be violating antitrust laws. . . . ¶Oklahoma unitization bill signed by Governor Kerr, becomes operative in mid-July. . . . ¶Doubt raised that new gas law in Texas can pass. . . . Operators insist Railroad Commission has ample authority, lacks enforcement machinery. . . . ¶Appropriation cut but Navy left $1,120,000 for Alaskan oil exploration. . . .

PRICES—Production cost questionnaires lagging. . . . Office of Price Administration offers to furnish accounting aid, if needed. . . . Replies wanted by May 1. . . . Data on cost of replacing reserves will be turned over to national industry committee, and apparently will be ignored by OPA. . . .

NATURAL GAS—Louisiana to carry fight to Supreme Court, continuing battle against increased exports. . . . Second round lost in Circuit Court to Memphis Natural Gas Co. . . . ¶Gas well completions in Texas more than double last year's pace. . . . ¶Producers resist sales to carbon-black plants because of extremely low prices. . . .

DRILLING—Completions skid 59 below previous week's record but oil wells are down only 18. . . . Gas wells off 17. . . . Dry holes down 24. . . .

MANPOWER—Industry retaining more 18-30 technicians than had been expected . . . Draft boards filling quotas from less essential industries but the danger is not entirely dead. . . . ¶From 70 to 90 per cent of discharged veterans returning to oil company jobs, softening shock of new inductions. . . .



This is the Army way of cleaning fuel containers. Pressure pump at right forces liquid into the containers to be cleaned. The vacuum blower at left evacuates the liquid and contamination, restoring the container to serviceable condition

Policy Committee to Weld Oil And Natural-Gas Interests

WASHINGTON.—With two important petroleum investigations slated for the next few months, industry leaders met last week in Washington to begin organization of a policy group representing both oil and natural-gas producers.

"The meeting was an effort to bring the gas and oil divisions of the industry together on problems common to the entire industry," Russell B. Brown, general counsel of the Independent Petroleum Association of America said.

The first task of the new group, as yet unnamed, will be to coordinate statements on policy for both oil and gas interests and to gather evidence to support the industry's position before the O'Mahoney committee investigations in May and later for the industry's part of the Federal Power Commission natural-gas investigations scheduled to open next fall.

A steering committee was appointed this week and will begin work shortly. William R. Boyd, Jr., president American Petroleum Institute and chairman of the Petroleum Industry War Council, will be chairman of the new group. Other members are: Brown, J. C. Hunter, president of the Mid-Continent Oil & Gas Co.; E. Buddrus, president, Independent Natural Gas Association, and J. French Robinson, president, American Gas Association.

Texas Probing Wasteful Practices in Handling Casinghead Gas

AUSTIN.—A committee representing the natural-gas industry of Texas, headed by James P. Nash, of Austin, has started work on gas-conservation problems with a view of making recommendations to the State Railroad Commission. It is taking up first the question of casinghead gas produced with oil.

A group of engineers is being sent by the committee to survey fields where gas flaring is worst. Sixty per cent of this waste is said to occur in 52 fields, and the committee hopes to stop most of this waste without intervention from state or federal agencies. Millions of cubic feet of gas is burned daily in Texas after it has helped bring oil to the surface, and it is believed by many that the most valuable part of the well's output may thus be lost.

The Senate and the House are considering bills, substantially alike in language and intent, designed to move this gas, after necessary processing, into pipe-line systems. One section of the measures stipulates that gas shall not be regarded as reasonably accessible to market if the buyers have to install treating and other facilities not required in other nearby areas. The same section stipulates that the volume of casinghead gas available to buyers shall be large enough to justify buyers in installing needed processing facilities. Gas may not be used for gas lift unless the Railroad Commission rules such use will not result in reservoir waste.

Another section stipulates that a gas-oil ratio higher than 2,000 is wasteful, but provides that the commission may allow ratios as high as 10,000 if conditions warrant, and even higher if the gas thus produced is used for legal purposes, excluding flaring and venting.

Some students of problems surrounding conservation of the state's natural-gas resources contend that if the Railroad Commission made use of such powers as it already possesses, much headway would be made without waiting for remedial action by the legislature. A recent opinion of the State Supreme Court indicates that the commission has wide powers in prevention of physical waste.

Gov. Coke Stevenson has named a 13-member committee of natural-gas industry leaders to help the railroad commission in dealing with Federal Power Commission. Texas officials fear Federal Power Commission plans to take over regulation of natural-gas production and ultimately the oil industry.

Canol Disposal to Be Supervised by Army

WASHINGTON.—Handling of the sale of the Canol project and equipment has been referred to the Assistant Chief of Staff, G.4, of the War Department General Staff, Lt. Gen. Brehon B. Sommervell told Senator E. H. Moore of Oklahoma last week. Action will be taken "according to existing laws and regulations," Sommervell said.

Earlier, Senator Moore had written to Sommervell that he believed the Canol project to be surplus property and thus subject to the Surplus Property Act of 1944 which requires Congressional consideration of sales of such surplus war properties as Canol. Under a 1942 agreement between U. S. and Canada, the Canol property was to be offered first to the Canadian government, then sold by public offering if the Canadian government did not elect to buy it, and finally, if the property were still unsold, referred to the Permanent Joint Board of Defense for recommendation.

Senator Moore, in his letter to General Sommervell, expressed the opinion that the Surplus Property Act superseded the 1942 agreement.

R.M.O.G.A. Preparing for Its Increasing Problems

CASPER, Wyo.—The directors of Rocky Mountain Oil & Gas Association have named four new committees to handle increasing problems facing its membership. The chairmen of these committees are: Taxation, J. F. Cullen, division manager Stanolind Oil & Gas Co.; public lands, Warren Skelton, independent; legal and legislative, H. H. Healy, division manager The Ohio Oil Co.; production, Carroll Kirk, Kirk Oil Co. Healy was chosen second vice president.

The new committee chairmen, along with the chairman of the finance committee, Fred Goodstein, president Trigood Oil Co., will make up the general committee of the association. The duties of this committee are to gather information pertaining to problems that affect the entire industry and present recommendations to the directors. The executive committee, which consists of the president, three vice presidents and treasurer, will handle routine business.

Two new members were added to the board of directors: H. C. Q. Clark, division manager Pure Oil Co., and H. H. Healy, division manager The Ohio Oil Co.

Bahamas Authorize Petroleum Exploration

The Bahamas House of Assembly last week passed a bill authorizing the British Government to explore for oil on 19 of the colony's 20 islands. New Providence Island, site of Nassau, the capital, was excluded from the franchise.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

The Tangible in Intangibles

THE petroleum industry, through a group of representative attorneys, has presented its position in regard to legal issues involved in the F. H. E. Oil Co. tax case, recently decided by the U. S. Circuit Court of Appeals of the Fifth District. The attorneys in their plea for rehearing have explained in a complete and comprehensive manner the background of laws, departmental rulings and court decisions on which oil producers, for more than a quarter century, have relied in electing to deduct as current expense their intangible drilling and development costs.

It is assumed that the industry, if necessary, will carry through to the highest court in seeking judicial approval of legal interpretations which will be the basis for future operations as they have been in the past.

Wholly aside from the pending legal questions, it should be made apparent to all concerned, including Congress, that there are issues in the F. H. E. case that go deeper than the procedure followed in the collection of taxes from a few thousand discoverers and producers of crude oil in this country. Even within the oil industry itself there has been a tendency in the past to dismiss intangible costs and allied tax regulations as something of no concern except within the producing division.

A realistic study of domestic producing developments since the conclusion of World War I will reveal that laws and regulations applying to intangible cost deductions and depletion allowances in production have been controlling in operating trends. These well-established tax policies had a vital part in the oil industry's preparedness at the start of World War II, and they have been equally vital in maintaining that preparedness through more than 3 years of constantly mounting emergency requirements.

If you went to the roots of why gasoline is retailed for 13.6 cents in Indianapolis, exclusive of federal and state excise taxes, with comparable net prices throughout the country, and industrial and other users buy fuel oils at 2 to 4 cents per gallon, you would find that petroleum's cheapness and service stem from adequate supplies.

These supplies in turn have come from the encouragement given to producers to use every facility at their command to find and produce oil. At best, their financial rewards through the ups and downs of the oil business have been modest. There is no industrial parallel to the hazards involved in drilling for and producing liquid petroleum at a rate which now exceeds 1.8 billion barrels yearly. Operators, if they are to continue as the aggressive front line of this industry, must have the protection which enables them to charge off currently specified operating expenses.

So there is definitely a tangible issue at stake in the matter of intangibles. Nothing could be more patent to those who will take the trouble to investigate. The alternative to a continuance of the tax program in effect since 1918 is a substantial revision in production practices, which would affect every phase of operation. A scarcity of crude oil, rather than an abundance, would be the inevitable result, with the accompanying higher prices for products to consumers far outweighing the additional revenue accruing from a permanent reversal in tax regulations.

INTERNATIONAL

Creole's Venezuelan Production Rising

Another increase in production from Venezuelan properties operated by Creole Petroleum Corp., the third successive rise this year, last week was reported for March. Daily average output rose to 425,084 bbl., a gain of 17,149 bbl. over February and an increase of 76,811 bbl. over production for the comparable month in 1944.

Creole properties in the Lake Maracaibo district accounted for 295,968 bbl. daily of last month's production while the eastern areas, including Cumarebo, produced 129,116 bbl. daily. Comparable figures for February operations were 285,685 bbl. daily in the Maracaibo district and 122,250 bbl. from eastern fields.

Creole completed 20 wells in Venezuela during March, including 16 oil producers. Seven of the producers were completed in the Jusepin field at average depth of 5,467 ft. Average initial production from Jusepin newly completed oil wells was 390 bbl. daily. Two exploratory completions were dry as were two tests in the Jusepin field. Four new oil wells in the B.C.F. area each averaged initial production of 961 bbl. daily.

Twenty-five rigs were operated by Creole in March. Nine were engaged in Jusepin development drilling and five were assigned to the B.C.F. field. Three were assigned to exploratory drilling.

Creole processed an average of 34,562 bbl. daily at its two active refineries in Venezuela. The Caripito refinery processed 27,013 bbl. daily while crude-oil runs at the La Salina plant averaged 7,549 bbl. per day during the month.

Central Burma Oil Field In Allied Army Path

Recapture of the Yenangyaung oil field in central Burma was imminent this week, marking the first step in returning Asiatic petroleum resources to Allied control since the Japanese invasion. Already British and Indian troops have occupied the Chauk area containing about 800 small wells. The Fourteenth Army was striking south under a military blackout in the direction of Yenangyaung, 30 miles south of Chauk. Yenangyaung, the richest oil field in Burma, consists of about 3,000 wells and normal production is about 18,000 bbl. daily.

Drilling to Be Resumed On Kuwait Concession

Plans for resuming drilling operations in Kuwait on the Persian Gulf are maturing, it was disclosed this week in the annual statement of Gulf Oil Corp. which owns a 50 per cent interest in the concession covering the entire country. Kuwait is estimated to contain reserves of approximately 10,000,000 bbl., based on a few widely spaced wells drilled before the war. Only sufficient production to meet fuel requirements has been withdrawn and drilling has been suspended since outbreak of the European war in 1939.

Mexico City Refinery to Be Completed Late This Year

WASHINGTON.—The Department of Commerce says that the new oil refinery near Mexico City, expected to cost not less than $15,000,000, is scheduled for completion late this year. Materials and equipment for the plant are being purchased in the United States and construction is being done by a United States engineering firm under the supervision of an oil company which serves in an advisory capacity to Petroleos Mexicanos.

Poza Rica Well Comes in Flowing 8,500 Bbl. Daily

MEXICO CITY.—Mexican Petroleum Administration announced last week that Poza Rica 48, first of five wells started in the Poza Rica field to be completed, had come in flowing 8,500-bbl. daily potential. Administration officials said they expect 3,000,000 cu. ft. daily of natural gas from Mission 1 at Reynosa, state of Tamaulipas, now being drilled. The new field is to supply Monterrey with gas unavailable from South Texas. The administration plans to drill 250 more wells this year.

These officials of the Arabian Government landed at Houston last week for an inspection of Texas oil fields before continuing to the San Francisco peace conference. They were met by representatives of The Texas Co. and Standard Oil Co. of California, co-owners of Arabian American Oil Co. Front row: A. M. Martin, vice president Arabian American; Shaikn Ahmed Abdul Jabbar, secretary to Prince Faisal; Prince Faisal, head of the delegation; B. E. Hull, president, Texas Pipe Line Co.; Prince Fahad, Prince Abdullah, son of Faisal; Prince Nawaf; Dr. Rashid Faroun, king's physician; J. Sayles Leach, vice president of The Texas Co., and A. J. Cunningham, president, Standard Oil Co. of Texas. Secretaries near Martin and Leach were unidentified

Congress May Be Asked to Define Immunity Under Pact

WASHINGTON.—Legislation may be asked to clarify the petroleum industry's position in regard to antitrust immunity under the proposed Anglo-American oil agreement it was learned following last week's meeting of the National Oil Policy Committee of the Petroleum Industry War Council.

While the committee declined to issue a statement following the meeting called April 18 by Deputy Petroleum Administrator Ralph K. Davies, informed sources agreed that considerable progress had been made. Oil men hope that disagreements among American Government and industry interests can be ironed out prior to reopening negotiations with Great Britain.

No legislation has been drafted yet but it is believed that a law similar to those covering the agricultural adjustment and civil aeronautics programs must be written to cover not only the oil agreement but other international commodity treaties which are expected to follow. Such a law would delegate authority to an executive branch of the Government to grant specific immunity, subject to standards and restrictions to antitrust actions resulting from steps taken by the industry under the international agreement. It is understood here that the policy committee was asked whether it would hold out for passage of such a law or whether a guarantee that the Government would ask it would be sufficient to remove industry objections to the treaty on this point.

Under Secretary of State Will Clayton was understood to have appeared before the committee. No representatives of the Department of Justice were heard but the policy group again discussed the unofficial position stated by Attorney General Francis Biddle in a closed meeting last January. It is thought now that an agreement with Department of Justice relieving the industry of fear of prosecution under the antitrust laws on actions taken under the treaty would not be sufficient. So far the question has been handled unofficially and no formal opinion has been requested from the attorney general. Sources close to that office point out that a formal opinion would be given on request by Secretary of the Interior Harold L. Ickes. Meanwhile the Department of Justice has let it be known that it frowns upon giving curbstone or informal opinions.

OPA Aid Offered in Compiling Cost Data

WASHINGTON. — The Office of Price Administration will furnish auditors to aid producers unable to fill out the crude oil cost survey before the May 1 deadline, it was learned here this week. Only a few producers have indicated that the collection of data required is too much of a job for their reduced staffs.

Some state associations as well have offered to assign auditors to help with the questionnaires. The California group, it is understood here, was first to step in to aid the smaller producers.

Aggregate figures, together with some breakdowns, of data obtained on replacement cost will be turned over to the National Crude Oil Industry Advisory Committee by OPA for its own use.

With the hope of completing a refiners cost survey close to the time the crude-oil survey is finished, OPA is scheduling a meeting of the National Refiners Industry Advisory Committee in Washington for early May. A subcommittee of the group has been preparing a report relative to the question of cost absorption by refiners of a possible increase which might be granted, as a result of the findings of the crude-oil survey, to the producers.

Boren Bill Would Increase Price of Oil and Products

WASHINGTON. — Rep. Lyle H. Boren, Oklahoma, has introduced in the House a bill to fix the price of crude oil and refined products by establishing an increase which would give producers a fair return and fixing a parity formula for determining the price of these products under regulations issued by Office of Price Administration.

The bill provides that in fixing prices under the price control act, OPA shall recognize the necessity of finding new oil reserves and maintaining a competitive position in the petroleum industry and to that end shall consider the parity prices as indicated by the relationship between the index based on the national average price of crude petroleum and the index of all commodities as reported by the United States Department of Labor, Bureau of Labor Statistics, in its wholesale commodity-price index based on the year 1926.

The bill provides further that ceiling prices for crude oil and refined products fixed by OPA "shall not be fixed or maintained at less than 80 per cent of parity and shall not exceed parity."

The bill was referred to the committee on banking and currency.

PAW Appoints Assistant Public Relations Director

WASHINGTON.—Michael Griffin, of Madison, Wis., has been appointed assistant director of public relations, Petroleum Administration for War.

Griffin has had wide experience in newspaper and public relations work. After four years as Washington correspondent for Time Magazine, he became city editor of the Louisville (Ky.) Courier-Journal a year ago, resigning to accept his present appointment.

West Edmond Pool to Have Water-Flooding Operation

OKLAHOMA CITY. — The State Corporation Commission has granted a group of oil operators permission to employ the water-flood process in the Bois d'Arc section of the Hunton lime formation in the West Edmond pool with a view to increasing production and ultimate recovery and if possible to halt the decline in bottom-hole pressure. The drive is to be accomplished by injecting salt water into 1 Robson, NE NE of 12-13n-5w, Canadian County.

This will be the first use of the water drive in the West Edmond pool. The operators applying for it are Peppers Refining Co., Skelly Oil Co., Sohio Petroleum Co., Stanolind Oil & Gas Co., Magnolia Petroleum Co., Mid-Continent Petroleum Corp., Amerada Petroleum Co., Anderson-Prichard Oil Corp., Sinclair Prairie Oil Co., F. G. and W. J. Fox, a copartnership, and L. A. Chudacoff.

Magnolia Posts Price for Crude at North Cleveland

DALLAS. — Magnolia Petroleum Petroleum Co. has made an initial posting of $1.26 for crude oil purchased in the North Cleveland field, Liberty County, Texas, effective March 22, all gaging on 100 per cent tank tables.

Review of Exploratory Drilling in 1944

by Frederick H. Lahee *

This article is a digest of the paper which Dr. Lahee prepares annually for The American Association of Petroleum Geologists. The full paper will be printed in the June Bulletin of the A.A.P.G.

IN this review of exploratory drilling in 1944 we have used the standardized classification which was fully explained in last year's review, printed in The Oil and Gas Journal, March 23, 1944. Except where otherwise designated, the statistics in this paper are similar to those used in our reports for 1939 to 1943 inclusive. These 1944 figures may be consistently compared with those published in our reports of 1939 to 1943.

In 1944, 4,778 exploratory holes were drilled, as contrasted with 3,843 in 1943, and the 1944 exploratory footage was 20,225,887 ft., as against 15,122,364 ft. in 1943. (See Fig. 1 and Table 1). The average depth of hole increased from 3,935 ft. in 1943 to 4,217 ft. in 1944.

On the map in Fig. 1, the numbers in parentheses indicate total footage drilled; figures preceding parentheses indicate the number of holes drilled; figures above the cross line are for producing wells, oil, oil and gas, condensate and gas, and gas; while figures below the line are for dry holes.

Selection of the location for a wildcat well may be based on geology, geophysics, or it may be based on some nontechnical suggestion, or requirement, such as "creekology", "hunch", "doodlebug", promotion, lease obligation, reported showing of oil or gas in holes previously drilled, etc. In some cases the reason for choosing the location can not be ascertained. In Table 2 are listed the reasons for drilling the exploratory holes in 1944, using the best information available from men familiar with such statistics, each in his own state or district.

These figures show that 21.9 per cent of the holes drilled on technical advice were producers as contrasted with 10.0 per cent successful in the case of the holes located without technical advice. Therefore in 1944, locations based on technical recommendations were twice as successful as those drilled without such advice.

Comparing last year's figures with those for 1944, we note the following: (1) There was a considerable increase in the exploratory effort in all important states. (2) the average depth of hole, in the states where 25 or more exploratory holes were drilled, increased in all states except Arkansas, Kansas, Kentucky, and Louisiana.

In Table 3, we have shown the distribution of the several classes of exploratory hole drilled in 1944. As might be expected, the percentage of success of outpost wells 41.72 per cent; of shallower pool tests 69.24 per cent; of deeper pool tests 41.86 per cent; and also of new pool wildcats 25.35 per cent; runs considerably higher than the percentage of success in new-field ("rank") wildcatting 11.03 per cent.

For this reason it has been suggested that during the present emergency the exploratory effort be concentrated on new-pool tests, and that much less drilling of new-field wildcats be undertaken. This idea may have been encouraged by the thoughts that under this kind of a program less steel might be required; that pipe-line facilities might already be available for newly found oil, and that at least a part of the preliminary technical exploration would have been accomplished.

In answer, we would remind ad-

*Chief geologist, Sun Oil Co.

TABLE 1—NUMBER OF OIL WELLS, GAS WELLS, CONDENSATE WELLS, AND DRY HOLES DRILLED AS EXPLORATORY TESTS IN 1944

	Oil producers		Gas producers		Condensate producers*		Dry		Total number of holes	Total footage drilled	Average depth of hole
	No. of holes	Footage drilled	No. of holes	Footage drilled	No. of holes	Footage drilled	No. of holes	Footage drilled			
Alabama	3	14,635	0	0	0	0	21	111,698	24	126,333	†
Arizona	0	0	0	0	0	0	1	3,609	1	3,609	†
Arkansas	2	16,241	0	0	1	7,091	72	322,319	75	345,651	4,609
California	58	283,291	13	74,949	0	0	244	1,079,261	315	1,437,501	4,563
Colorado	3	12,377	1	7,005	0	0	7	36,240	11	55,622	†
Florida	0	0	0	0	0	0	7	38,765	7	38,765	†
Georgia	0	0	0	0	0	0	6	29,730	6	29,730	†
Illinois	79	199,875	0	0	0	0	355	859,655	434	1,059,530	2,441
Indiana	14	30,178	0	0	0	0	77	153,802	91	183,980	2,022
Iowa	0	0	0	0	0	0	1	2,000	1	2,000	†
Kansas	54	181,578	12	48,590	0	0	422	1,568,814	488	1,796,982	3,686
Kentucky (W)	20	52,147	1	667	0	0	162	315,116	192	367,930	1,916
Louisiana	44	343,342	4	32,957	21	232,885	169	1,276,653	238	1,885,837	7,924
Michigan	20	55,434	3	6,967	0	0	275	688,864	298	751,265	2,521
Mississippi	7	56,329	1	2,328	1	9,967	64	483,103	73	551,727	7,558
Missouri	0	0	0	0	0	0	5	8,682	5	8,682	†
Montana	4	13,365	3	7,076	0	0	44	133,869	51	154,310	3,026
Nebraska	0	0	0	0	0	0	16	44,879	16	44,879	†
New Mexico	8	37,566	1	9,592	0	0	65	216,700	74	263,858	3,566
New York	0	0	1	3,907	0	0	15	58,386	16	62,293	†
Ohio	10	23,286	24	73,910	0	0	77	252,285	111	349,463	3,148
Oklahoma	71	278,712	16	51,866	0	0	297	1,252,837	384	1,583,415	4,123
Pennsylvania	1	2,065	12	32,345	0	0	29	95,662	42	129,992	3,095
Tennessee	1	522	3	3,845	0	0	16	15,248	20	19,615	†
Texas	279	1,382,275	38	184,858	63	473,939	1,365	6,619,188	1,745	8,660,260	4,963
Utah	0	0	0	0	0	0	1	2,651	1	2,651	†
W. Virginia	0	0	14	51,703	0	0	22	108,629	36	160,335	4,454
Wyoming	22	75,098	2	7,552	0	0	17	65,022	41	147,672	3,602
Total	709	3,058,318	149	600,020	86	723,882	3,852	15,843,607	4,796	20,225,887	4,217

*In former years statistics have included condensate wells with gas wells. †Averages have been recorded here only for states where more than 25 exploratory holes were drilled in 1944.

TABLE 2—BASIS FOR LOCATING EXPLORATORY HOLES DRILLED IN 1944

State—	Geology		Geophysics*		Geology and geophysics*		Sundry nontechnical		Unknown		Totals		Grand total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
Alabama	2	4	0	9	1	4	0	1	0	3	3	21	24
Arizona	0	1	0	0	0	0	0	0	0	0	0	1	1
Arkansas	0	29	2	35	1	5	0	2	0	1	3	72	75
California	49	159	5	37	16	37	1	8	0	3	71	244	315
Colorado	3	3	1	2	0	0	0	2	0	0	4	7	11
Florida	0	1	0	2	0	0	0	4	0	0	0	7	7
Georgia	0	0	0	2	0	0	0	4	0	0	0	6	6
Illinois	54	236	15	51	5	16	5	52	0	0	79	355	434
Indiana	12	17	1	20	0	0	0	35	1	5	14	77	91
Iowa	0	1	0	0	0	0	0	0	0	0	0	1	1
Kansas	44	196	8	59	2	10	12	150	0	7	66	422	488
Kentucky (West)	20	84	0	0	0	0	10	77	0	1	30	162	192
Louisiana	32	64	18	65	19	38	0	2	0	0	69	169	238
Michigan	16	129	1	2	0	0	6	144	0	0	23	275	298
Mississippi	0	9	5	39	3	8	1	7	0	1	9	64	73
Missouri	0	0	0	0	0	0	0	0	0	5	0	5	5
Montana	3	13	0	3	1	0	1	6	2	22	7	44	51
Nebraska	0	6	0	0	0	0	0	10	0	0	0	16	16
New Mexico	6	31	1	6	2	10	0	16	0	2	9	65	74
New York	0	9	1	0	0	0	0	0	0	6	1	15	16
Ohio	12	38	0	3	0	0	20	31	2	5	34	77	111
Oklahoma	47	170	19	89	12	0	8	38	1	0	87	297	384
Pennsylvania	10	15	0	0	0	0	0	0	3	14	13	29	42
Tennessee	2	7	0	0	0	0	2	9	0	0	4	16	20
Texas	263	852	66	226	37	134	13	120	1	33	380	1,365	1,745
Utah	0	1	0	0	0	0	0	0	0	0	0	1	1
West Virginia	4	7	0	0	0	0	10	15	0	0	14	22	36
Wyoming	17	12	3	0	3	1	1	2	0	2	24	17	41
Total	596	2,094	†146	†650	‡102	‡263	90	735	10	110	944	3,852	4,796

*Including geochemistry. †Of these holes, 142 producers and 596 dry holes were located by seismograph. ‡Of these holes, 102 producers and 248 dry holes were located by seismograph and geology.

TABLE 3

Distribution of Exploratory Wells of 1944 by Classes and Results of Drilling

	All states included in Table 1	
	No.	Pct.
Outposts:		
Producers	315	41.72
Dry holes	440	58.28
Total	755	100.00
Shallower-pool tests:		
Producers	18	69.24
Dry holes	8	30.76
Total	26	100.00
Deeper-pool tests:		
Producers	90	41.86
Dry holes	125	58.14
Total	215	100.00
New-pool wildcats:		
Producers	179	25.35
Dry holes	527	74.65
Total	706	100.00
New-field wildcats:		
Producers	342	11.03
Dry holes	2,752	88.97
Total	3,094	100.00
Total producers	944	.....
Total dry holes	3,852	.....
Grand total	4,796	.....

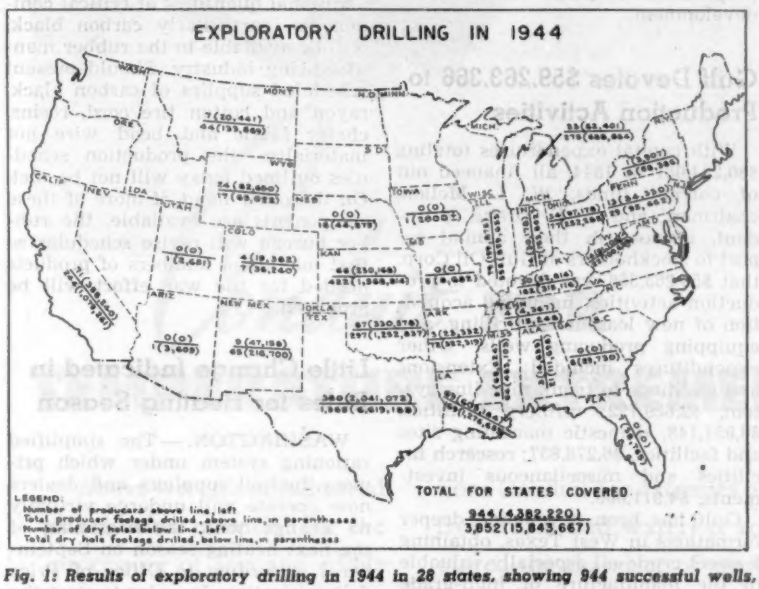

EXPLORATORY DRILLING IN 1944
LEGEND:
Number of producers above line, left
Total producer footage drilled, above line, in parentheses
Number of dry holes below line, left
Total dry hole footage drilled, below line, in parentheses
TOTAL FOR STATES COVERED
944 (4,382,220)
3,852 (15,843,667)

Fig. 1: Results of exploratory drilling in 1944 in 28 states, showing 944 successful wells, or 19.6 per cent of total number of exploratory wells, and 21.1 per cent of total exploratory footage

vocates of this program that much less steel is needed for a given number of new-field wildcats of average depth than for an equal footage of new-pool tests; that pipe lines are now pretty well filled and consequently new-pool discoveries might necessitate new pipe-line construction; and that even after completion of much geological and geophysical investigation, there still remains a large element of risk, due to unknown geological conditions on structures that have produced oil.

Any reduction in the search for new productive areas, and any program that would seriously limit exploration by new-field wildcats, would be a serious menace to the prospects for finding adequate oil reserves in the next few years. We must beware lest the seemingly easily accomplished upward trend in exploratory drilling during 1944 leads to a false impression that the same results may be as easily obtained at any time in the future.

To maintain an adequate supply of oil reserves, the search for new fields, through new-field wildcatting, should be carried on uninterruptedly with increasing vigor.

I. G. Farben Rubber Plant Captured by Americans

WASHINGTON.—The I. G. Farben Co.'s largest synthetic-rubber plant, along with its chief chemist, has been captured by American troops, Army officials here have disclosed. The plant, which had been turning out 6,000 tons of rubber monthly, was taken undamaged. It covers 4 square miles on the Saale River south of Halle. It suspended operations a few days ago, because the American advance had cut off its supply of raw materials.

Committee Approves Drake Park Appropriation Bill

HARRISBURG.—A bill appropriating $40,000 for the Drake Well Memorial Park at Titusville has been favorably reported by committee in the General Assembly. The bill, sponsored by John H. McKinney, of Venango County, and R. B. Mahany, of Crawford, was introduced last week.

Terms of the bill provide that the money be appropriated from the general fund of the state to the State Historical Commission for use in financing initial phases of the proposed development program at Drake Park. The appropriations are in addition to $19,000 set up for maintenance of the park in the coming biennium.

The two principal items intended to be covered in the appropriation provided in the McKinney-Mahany measure are construction of a replica of the original Drake well, and payment of fees of the architects who have done extensive work in preparation of plans for the park development.

Gulf Devotes $59,263,366 to Production Activities

With capital expenditures totaling $80,294,081 in 1944, all financed out of current funds, W. L. Mellon, chairman, and J. F. Drake, president, disclose in their annual report to stockholders of Gulf Oil Corp. that $59,263,366 was devoted to production activities, including acquisition of new leaseholds, drilling, and equipping producing wells. Other expenditures included: Extensions and additions to trunk pipe-line system, $2,889,722; refinery facilities, $6,951,148; domestic marketing sites and facilities, $6,278,837; research facilities and miscellaneous investments, $4,911,008.

Gulf has been developing deeper formations in West Texas, obtaining a sweet crude oil especially valuable in the manufacture of high-grade lubricants.

"In West Texas and adjacent New Mexico," says the report, "attention has been directed particularly to areas under which sweet oil might be found, but lands which might yield sulfur-bearing crude oil, have not been overlooked." The company's pipe-line system operated at capacity throughout the year.

"Extraordinary demand seems likely to continue until the end of the war in the Pacific," the report says. "It is anticipated that there will be some drop in the military requirements after the cessation of hostilities in Europe, but the quantity thus made available can be readily absorbed by more adequate allowance to business and civilians.

"There will be a continuing improvement in the quality of gasoline and lubricants, as the result both of equipment installed during the war and of extensive research. However, the aviation fuel which Gulf and many other companies have supplied in large quantities for bomber and fighter planes would not be suitable for motor cars. The higher cost of this fuel would not be justified: the motorist does not need the special performance that is essential for these combat units, and automobile engines could not efficiently utilize the properties that are peculiar to these fuels."

Tire-Production Schedule Moved to Higher Level

WASHINGTON.— Tire-production schedules for the second quarter of 1945 released by W. J. Sears, deputy director of the rubber bureau, War Production Board, show upward revision. This has been possible, Sears said, because it is expected that additional quantities of critical components, particularly carbon black, will be available to the rubber manufacturing industry. Should present scheduled supplies of carbon black, rayon and cotton tire cord, rosins, chafer fabric and bead wire not materialize, the production schedules outlined today will not be met. On the other hand, if more of these components are available, the rubber bureau will revise schedules so that maximum numbers of products needed for the war effort will be produced.

Little Change Indicated in Rules for Heating Season

WASHINGTON. — The simplified rationing system under which primary fuel-oil suppliers and dealers now operate will undergo virtually no change with the beginning of the next heating season on September 1, according to Office of Price Administration. In order to start the movement of next winter's suppliers, first "period" coupons will become valid on June 1, 1945. They will have a value of 10 gal. per unit.

The new program is based on supply estimates received from Petroleum Administration for War. About the same quantity of fuel oil will be available for civilian consumption as during the past season. A departure from last year's policy will invalidate all of this year's ration coupons for consumer use at the close of the present season, August 31. Last year, unused coupons of the previous season were permitted to remain valid. This reduced the nation's fuel-oil supply by about 2,500,000 bbl., a drain that prospective supplies for 1945-46 will not permit, OPA said.

Ration coupons will be issued again before the beginning of the new heating year to permit movement of fuel oil into consumers' storage tanks during the summer and to free storage facilities of dealers and distributors for fuel oil that must be accumulated for later delivery. Plans have been completed for an intensive educational campaign, in which dealers will be urged to participate, to get consumers to return their applications promptly so that the majority of new coupons may be issued during June and July, OPA reported.

DEATHS

Jerry Chesnutt, 55, division superintendent for American Republics Corp., died April 19 in San Angelo, Tex. In the oil business since 1907, Chesnutt was one of the first oil-lease buyers in West Texas.

Curtis W. McCord, 78, drilling contractor, died April 18 in Rockland Township, Venango County, Pennsylvania.

Joseph Alexander Robertson, 80, prominent among Canadian drillers in foreign fields, died at Petrolia, Ontario, recently. His drilling career took him to Borneo, Cuba, and Egypt, in addition to Canadian fields.

L. L. Taylor, 55, district landman in Kansas for The Carter Oil Co. and an employe of that company for 30 years, died April 18 in Halstead, Kans.

Wray Richards, 48, widely known Texas oil operator, with offices in Longview, Houston, Corpus Christi, Alice and Luling, died April 16 in Luling. Richards headed W. R. Drilling Co. and Wray Richards Tank Enterprises.

Charles S. Rosenthal, 75, dean of the Chicago oil-trade community, died April 16 at Miami Beach, Fla., where he had spent the winter. For 26 years Rosenthal was vice president and general manager of Apex Motor Fuel Co., Chicago, and at his death was president of Illinois Marketers Association. He founded the Chicago Oil Men's Club and for 7 years was its president.

Horace H. Wilkins, 68, former manager of the telegraph department of Southern Group Pipe Lines in Oil City, Pa., died recently in Long Beach, Calif. Shortly after the turn of the century Wilkins was chief engineer for J. M. Guffey Petroleum Co. at Beaumont, Tex.

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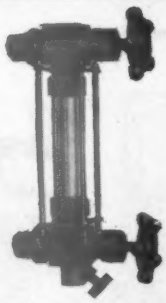

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Scraper Barge Performs Triple Function In Gulf's Quarantine Bay Operations

by E. H. Short, Jr.

IN Quarantine Bay, off the east shore of the Louisiana Delta region, Gulf Oil Corp. operates 41 flowing wells. The daily allowed production from these wells amounts to approximately 7,850 bbl. The productive horizons in this offshore field range from approximately 7,300 to 10,000 ft. in depth, and the wellhead flowing pressures vary between 200 and 3,000 psi.

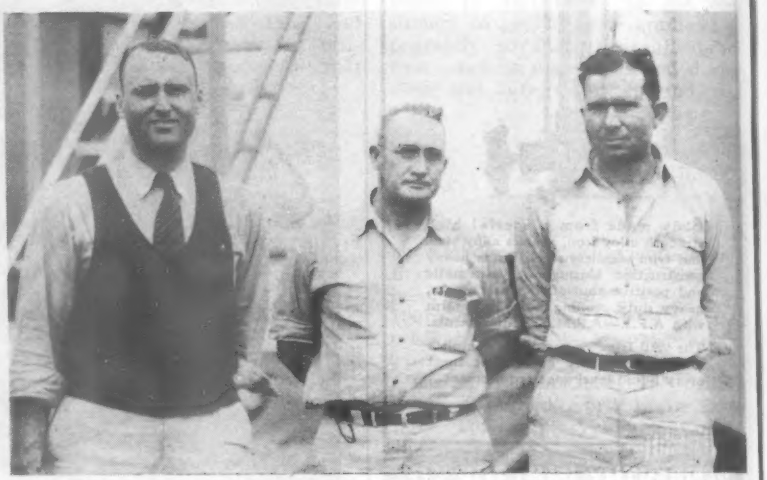
Operating in this field is a Gulf designed barge which might be properly referred to as a three-in-one barge. In the field it is called a scraper barge. However, it is equipped to fight fire, scrape paraffin from tubing, and steam paraffin from lead lines. A two-man crew operates both the barge and the assigned towboat.

The scraper barge used in Quarantine Bay operations is 45 ft. long, 16 ft. wide, and 4 ft. deep. The dimensional area of the deck provides ample room for all equipment, and the remaining space allows free movement of the crew while performing the servicing operations.

The fire-fighting equipment, located in a cabin at one end of the barge, consists of a 22-hp. engine, 2-in. rotary pump, 300 ft. of hose, and a mixing hopper.

The equipment carried on the barge for scraping paraffin from the tubing includes such major items as measuring line, scraping knives, stroke jars and stem, rope socket, and wire-line stuffing box; together with the necessary assortment of wrenches and hand tools. The paraffin-removal procedure followed in Quarantine Bay involves lowering the tools down the tubing until free movement, indicating the base of the paraffin, is obtained. The tools are then pulled up and the paraffin scraped from the tubing is ejected by the normal flow of the well.

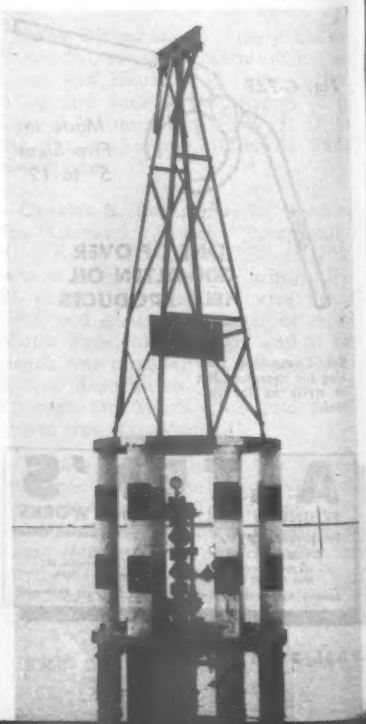
The steamer, used in heating paraffin from lead lines, is the most recent addition to the scraper barge. The use of the steam as a means of paraffin removal has been instrumental in effecting a substantial reduction in time and expense previously required for this type of remedial operation. Most of the lead lines in Quarantine Bay are 3-in.



F. G. Courtney, Gulf Oil Corp. production engineer, Harvey, La., office; R. A. Fisher, field foreman, and W. H. LeGrand, production engineer, Buras, La.

Fig. 1—(Below) An 80-hp. steamer installed on Gulf scraper barge. This unit, used in removing paraffin from Quarantine Bay flow lines, gets up full steam pressure in 3 minutes

Fig. 2—(Right) Gulf-type well protectors, in Quarantine Bay field



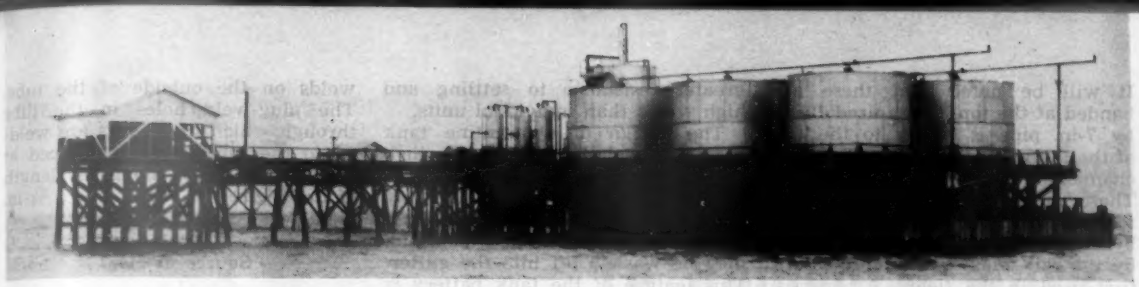


Fig. 3—Typical tank battery installation used in Gulf Oil Corp. Quarantine Bay operations

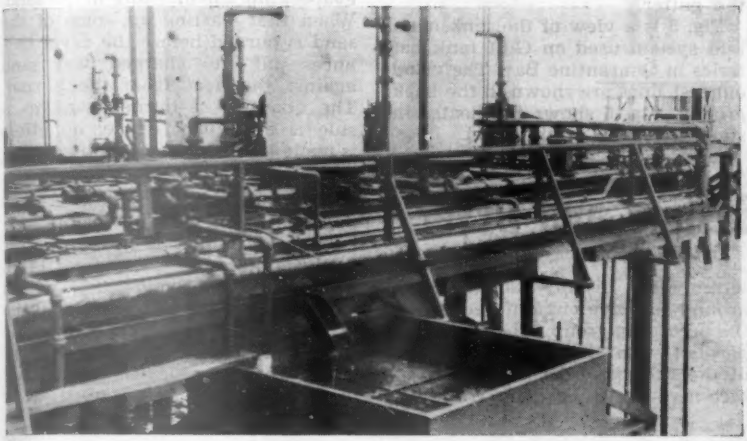


Fig. 4—Drainage gutter built completely around battery empties into sump

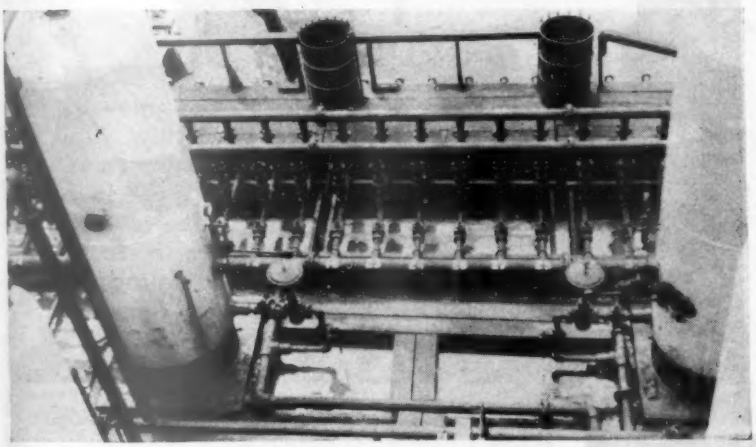


Fig. 5—Gulf tank-battery header system. Grind out test lines shown around rim of two drums in background

After these lines have been at the bottom of the bay for some time, they become covered with sand and silt. Before the installation of steaming equipment on the Gulf barge, it was sometimes more economical to replace a paraffin-plugged lead line than to locate and remove it for cleaning. Paraffin solvents were used to some extent in the attempt to keep the flow lines clean, but this method did not prove altogether satisfactory.

During the winter, the temperature of the water in the bay is often as low as 40° F., and when the possibility of steaming paraffin from lead lines was first considered, there was some speculation as to whether the temperature of the water would condense the steam too rapidly for it to loosen the accumulated paraffin. However, the silt and sand which make it so difficult and sometimes impossible to locate and lift a line, acts as an insulator, so that if steam in sufficient volume is admitted into the line, the paraffin is melted sufficiently to permit it to be carried to the tank by the normal flow of the well.

The coil-type steamer used in this type of work is shown in Fig. 1. It is rated at 80 hp. and will evaporate approximately 2,500 lb. of water per hour, and furnish superheat steam at a maximum pressure of 300 lb. This steam unit is equipped with a 4-hp. gasoline motor which operated feed-water pump, fuel pump, magneto for ignition and blower for combustion air. When started up, full pressure of steam is available in approximately 3 minutes.

Steaming Lead Lines

In steaming lead lines, a flexible steel hose from the steamer is tied into the flow line at the well. The capacity of the steamer is then turned into the lead line while the well is permitted to flow. The length of time required to clean a lead line depends upon the length of the line and the accumulation of paraffin; however, about 3½ hours approximates the average time per lead line.

The Gulf well protectors used in Quarantine Bay, and also in other water operations, is shown in Fig. 2. These constructed by first driving six 12-in. diameter piling so that the ends are 2 ft. above the water.

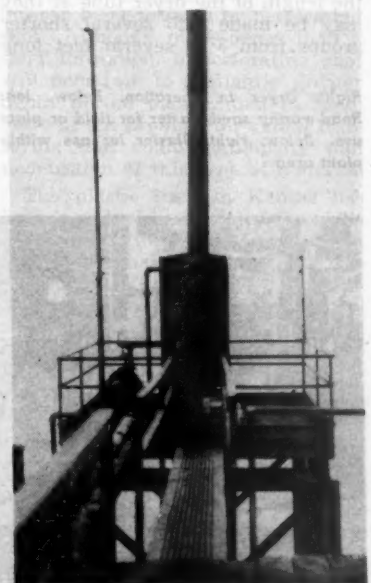


Fig. 6—Gulf heater installation at Quarantine Bay tank battery

It will be noted that these are banded at the top. Galvanized 10-in. by 7-in. pipe is bolted to the top of the piling. The protectors in main channels are painted red and white. These sturdy, compact well protectors permit much closer approach by the servicing barge then afforded by the rail fence type of protectors first used in the field.

Gulf tank batteries on water operations (Fig. 3) represent the best type to be seen in coastal operations. Built approximately square shaped, the piling is tied together so that the foundation is one unit. When compared to the separate tank platforms used in some fields, it is apparent that the bearing obtained with Gulf foundations should offer greater resistance to settling and high winds than individual units.

The design of Quarantine tank batteries includes a gutter which extends around the entire platform. The platform is leakproof and any oil, which may be lost while making changes or repairs to the manifold, may be washed off into the gutter. This feature of the tank battery is shown in Fig. 4. In the foreground is an 8 ft. by 8 ft. by 6 ft. sump which catches the discharge from the gutter.

Fig. 5 is a view of the tank manifold system used on Gulf tank batteries in Quarantine Bay. The grind-out test lines are shown in the background. Fig. 6 shows the heater installation used in the field.

Plant-Built Sand Blasters and Dryer

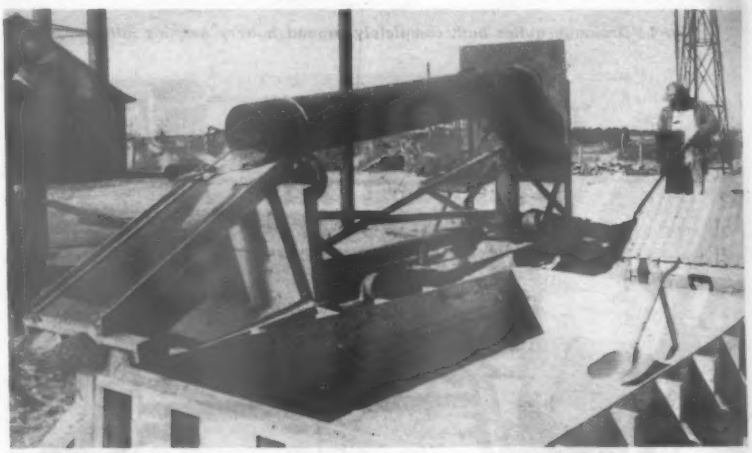
TWO different types of mobile sand-blasting machines are illustrated in the accompanying photographs, along with a rotary dryer which is used for removing moisture from blasting sand. The unit which is equipped with pneumatic tires is roadworthy at slow speeds and the other machine is suitably built for hand moving within the plant area. The machines proper are constructed according to the basic designs for normal sand-blast equipment.

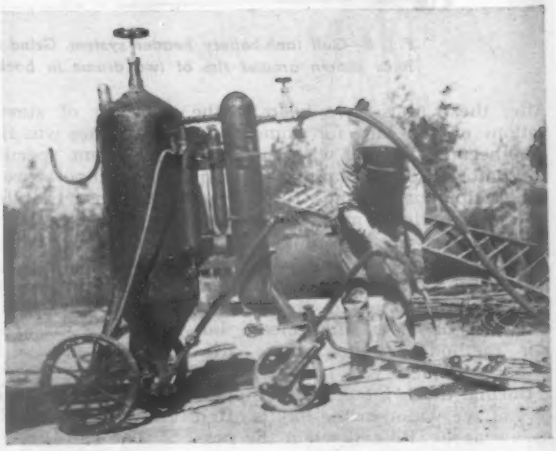
The dryer is made from a 10-ft. to 12-ft. length of 14-in. or 16-in. o.d. pipe. Flights made of 2-in. by 2-in. angles about 3 ft. long are equally spaced at 90° around the inside circumference of the pipe. The flights may run continuously throughout the length of the dryer tube or they may be made into several shorter groups from 3 to several feet long with each group staggered 45° around the pipe circumference from the preceding group. The flights run parallel with the longitudinal axis of the tube in order to smplify attachment which is done with plug welds on the outside of the tube. The plug-weld holes in the tube through which the flights are welded to the tube body are spaced at 10 to 12 in. apart along the length of the flight and are ⅝-in. to ¾-in. diameter.

Source of Heat

An open-flame gas burner which is located at the discharge end of the dryer furnishes the heat for evaporating the moisture in the sand. When first starting up, some of the sand is burned before the dryer balances out the charged wet sand against the heat from the burner. The quantity of burned sand as a rule is negligible; hence, no effort is made to work out corrective measures.

The exact slope of the dryer tube depends upon several factors and is best determined by trial-and-error methods. Rotating speeds for a 14-in. to 16-in. tube normally fall within 30 to 50 r.p.m. as determined by the driving machinery. Because of the slow speeds at which the dryer operates very low power is required to rotate the dryer under full loads.





Right: Dryer in operation. Below, left: Road-worthy sand-blaster for field or plant use. Below, right: Blaster for use within plant area

Plastics Now Adapted To Remedial Work In Kansas Wells

Fig. 1—Service equipment for handling a plastic plug-off job

The plastic described here was developed especially for wells with low bottom-hole temperatures. It is a bifluid chemical, and is introduced into the well by means of a specially designed bailer. More than 50 jobs have already been completed in Kansas.

PLASTIC material as a plugging agent is now in extensive use in Kansas where it is being applied to a wide range of problems peculiar to the production of that area. Since the introduction of the service in Kansas in October 1944, more than 50 jobs have been completed, the list covering about as many unusual applications as it does regular plug-back operations. While the majority of the applications have been successful, others have been only doubtfully so and because the time element has not been sufficient to allow the accumulation of data necessary to draw positive conclusions in all cases, a study of applications to date is distinctly favorable.

Plastic is a versatile tool. By proper handling it can be made applicable to a great number of completion and production problems. Its actual range of possibilities will only become evident as its actual use becomes more extensive. Of all uses, that of straight plug-back to reduce water-oil ratio is the most important single use in Kansas. However, it can be applied to gas-oil-ratio control as well as water, to caving conditions, to setting of liners, stage plugging, sectional plugging, etc., and is stable under acid treatment but can be penetrated by perforating shot. Although more dense than a sand formation, a perforating shot will penetrate to a slightly greater depth in the plastic than in sand, yet will not produce the radial fracturing that could accompany shot penetration of this type of material.

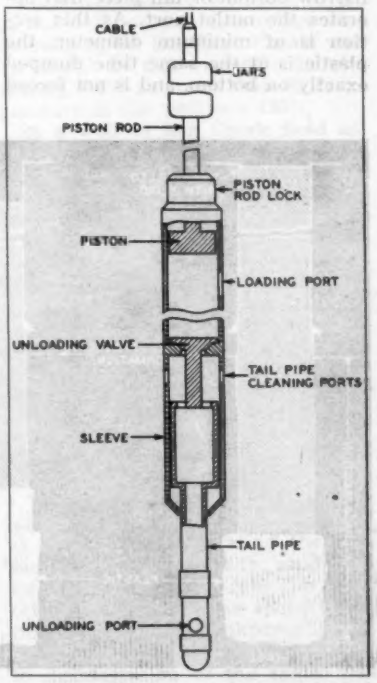


Fig. 2—Plastic service dump bailer

The plastic used in Kansas has been developed especially for wells with low bottom-hole temperatures. It is a bifluid chemical, mixed at the location and introduced into the well by means of a bailer of special design. It is compounded to set up, with the assistance of a catalyst, under existing bottom-hole temperatures at the end of 4 hours' time. While a considerable variation in formation temperatures would result in corresponding wide variations in time of solidification, the relatively narrow range of bottom-hole temperatures prevalent in western Kansas produce only inconsequential variations in setting times.

As introduced into the well, the plastic is highly penetrative as well as adhesive. Its fluidity increases

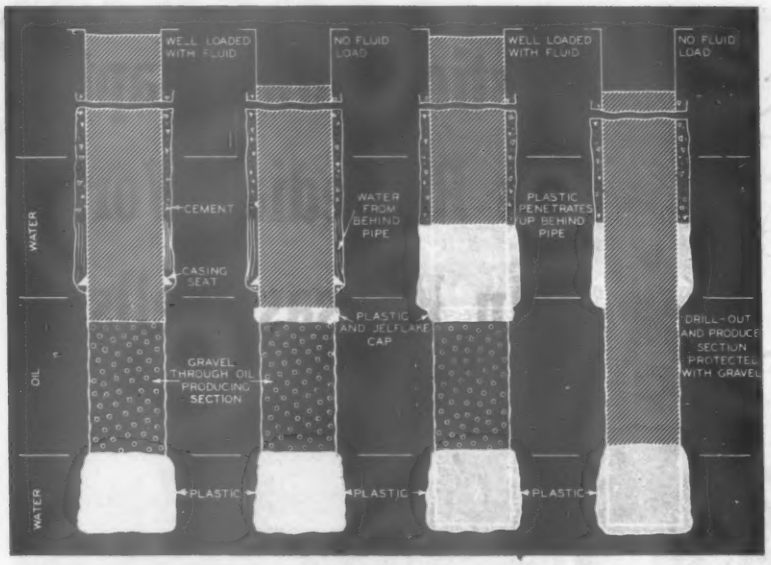


Fig. 3—Bottom water and casing leak

with increased temperatures and at the temperature existing in Kansas wells very sizable penetration is obtained even in tight dolomite cores. This penetrating quality of the mixture provides high bonding in the hardened material by providing innumerable intrusions of the fluid into the formation, and this quality is increased in value by a high contact bondage.

Bailer Method of Dumping

In Kansas, where bottom-hole pressure and other conditions influencing the manner of plastic application are not extreme, the bailer-dump method of placing the plastic is employed. The normal procedure in Kansas is to obtain what squeezing action may be called for by loading the hole above the normal fluid level. This manner of overloading the static guarantees an excess of introductory pressure and if the formation is receptive to any degree, some penetration of the porosity results through the above-normal pressure. The degree of overload required is an estimate based upon the characteristics of the formation and the necessity of gaining penetration.

To provide proper dumping a bailer of special design as shown in Fig. 2 is used. The plastic is mixed and loaded, in the calculated volume, through a port in the side of the bailer. A piston which forms the head of the receiving chamber is then lowered until it is in contact with the plastic. The action of this piston, in addition to confining the plastic, opens a port in the side of the bailer through which well fluids enter on the top side of the piston. Packing, aided by the equalization of pressure prevents seepage past the piston.

When set on bottom the tail pipe of the bailer, in diameter the equivalent of tubing, operates as the plastic exhaust or outlet port. A plunger-type valve automatically lifts into the plastic, opening the outlet channel when the bailer is set on bottom. The piston after displacing the plastic locks in position and prevents the possible formation of a partial vacuum when the bailer is lifted and any subsequent tendency toward sucking back into the bailer any of the plastic already dumped. Another desirable feature of this bailer is the narrow bottom or tail piece that operates the outlet port. As this section is of minimum diameter, the plastic is at the same time dumped exactly on bottom, and is not forced to false heights in the well as it would be around a bailer or bailer extension of larger diameter and therefore of greater bulk.

A Clean Well Important

Of prime importance in obtaining successful plastic application is the condition of the hole when the material is dumped. It must be clean.

Cleaning to total depth with an ordinary bailer can leave up to a foot of debris and muck on bottom. This sludge-like material may become dispersed through the plastic when the dump is made with a brittle, rather porous, material resulting from the set. Such contamination is decidedly detrimental to the operation. Water and crude oil are no obstacles, but inclusions of unconsolidated foreign matter has accounted for some of the doubtfully successful operations.

Practice has indicated that best results are to be obtained if the well is cleaned to bottom by one of the suction or pump-type bailers. In this way the very small amount of material that might be left in the hole is minimized and can safely be assumed as a negligible amount. While a good bottom-hole plastic job might be made in a poorly cleaned hole, a thoroughly cleaned well is the best guarantee of good results.

Use of Sand or Gravel as a Bridge

Sand or gravel has been used in conjunction with plastic in a number of Kansas operations primarily as a bridging material. As an instance, it was desired to plug off a water zone near the casing in a well in addition to the lower section of the pay strata itself. (See Fig. 3). The latter was plugged with plastic in a single operation. The well was

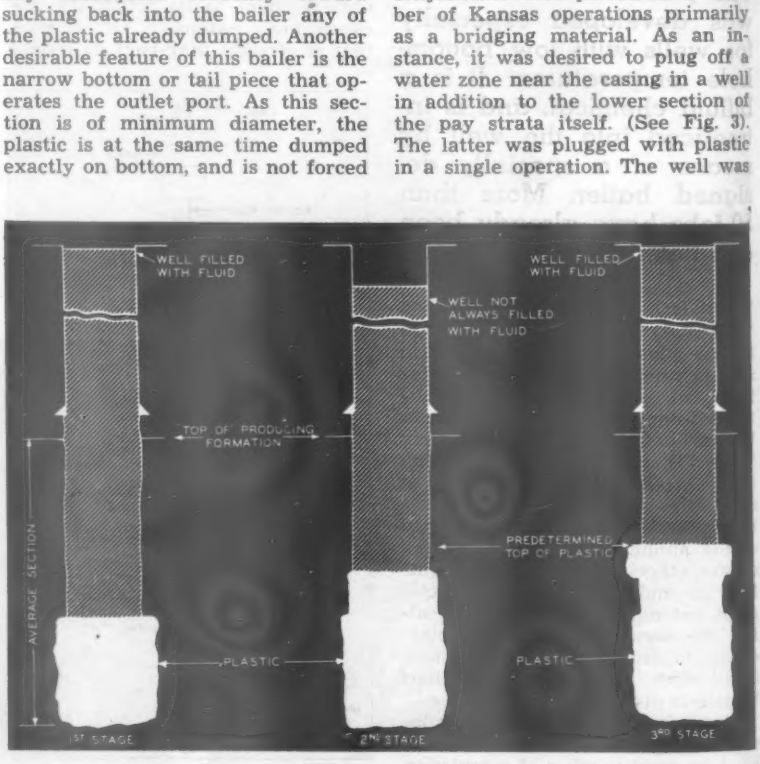


Fig. 4—Bottom-hole plastic plug

then filled up to a point just below the top zone with sand. A dump of plastic containing jelflake was then made to provide a cap for the sand and to act as a impermeable cap for further work in plugging off the top water section. When the latter work was complete, the plastic was drilled through and the sand pumped out of the pay area. Such use of sand or gravel, as a temporary bridge, is quick and cheap.

Sand can be mixed with the plastic in the well to increase the volume when conditions warrant. A bulk fillup may be made with gravel where a lower zone is being protected. Jelflake and similar materials can be included in the plastic to reduce the penetration of the plastic on special jobs.

Plastic is being used to plug off perforations through cementing casing, and in the reserve cases, zones of possible production have been perforated after being plastically plugged off. Acid treatment is practical naturally or through perforations in plastic without endangering the bond for the plastic is stable in treating solutions of hydrochloric acid.

Case Histories

Case histories are difficult of analysis. There is a vast number of variables, and any one of them if not correctly evaluated might justify the rejection of an analysis. A difference in pumping rates before and after a plastic job, a change in well equipment, idleness of the well with accompanying interruption of fluid flow in the formation — these and other variables make interpretation of all but the simplest of applications hazardous and of doubtful significance. More experience in the field will assist in making comparative evaluations of the before and after characteristics of a well.

The never-ending problem of counteracting bottom-hole water has become a major plastic application. In general, the use of plastic has been comparable to the use of other materials for this purpose. Formation water rises as the oil is withdrawn, in this manner increasing the watered section, the water-oil ratio and the necessity of decreasing the water into the well. A basic method has been successive plugging operations employing a variety of materials.

A well in Zenith that was producing too much water was plugged back with plastic. Prior to the plugging operation the well was making 100 bbl. of water with 7 oil daily. Immediately following the application no appreciable difference in production was to be noted. However, as the well was continued on production a gradual decline in water volumes was evident until a new apparent level of water-oil proportion was reached, this at 8 bbl. of water and 10 of oil daily.

While there is no means of reaching proven conclusions regarding this apparent lag between application and affect, the same circumstance has been noted in other similar operations and it has been suggested as probable that the area of the pay laterally from the plug has become "watered" and that such water must be exhausted by being produced before the job can be evaluated. For this reason initial tests following a plastic job are not considered as accurately indicative.

In South Silica a well in Arbuckle was producing 74 per cent water, 26 per cent oil. After being plugged back with 21 gal. of plastic the well pumped 15 bbl. of oil and no water daily, or at an oil rate equal to the total fluid rate prior to treatment.

In Fairport field, a Kansas City well was producing 99 per cent water, 1 per cent oil. Operators decided to plug off the entire Kansas City section in favor of testing Arbuckle lime at greater depth. A first dump of 72 gal. of plastic did not completely shut off the Kansas City, but a second dump of 18 gal. was successful. Pressure was put on the plastic by overloading the static, and a complete shutoff was obtained.

First Application

The first application in the state, made in Lake City field, was on a well completed in Douglass formation where 4 ft. of perforations had failed to respond to squeeze operations normally successful in shutting off old perforations. In this particular case the operator wished to deepen the well because of excessive water ratio in the Douglass. Plastic was successful in this operation in obtaining a 100 per cent shutoff. Temperature in the well was 120°.

In a well in Big Creek field an unusual job was so recently completed that results are not yet available. The application again illustrates the versatility of plastic materials. In this well, casing was set too high when the test was originally completed, with the result that there was a space of some 5 ft. between the shoe and the top of the pay. Had this interval been hard and tight the error in spotting the casing might not have mattered. On the contrary, however, the 5-ft. section was of shale which continuously sluffed off into the pay section below.

The well was carefully measured and the temperature was checked at 128°. Hole penetrating the pay section was filled with sand and topped with a plastic cap. The theoretical capacity of the space to be filled, disregarding unknown lateral increase in the hole diameter due to disintegration of the shale, was calculated and this amount of plastic was mixed and run into the hole. After allowing time to set, a measurement was made in order to determine the extent of fillup. Another calculation was made of the reduced requirements and a second dump was made and subjected to static overload. Consecutive applications filled the void; the difference between calculated requirements and measured fillup went to reduce the cavity and as a penetrant into the fractures of the shale bed.

Calculation of Plastic Volumes

In arriving at the proper volume of plastic to dump, the service engineer calculates the actual volume of space to be filled assuming the hole is neither enlarged nor will accept the plastic as a penetrant. Therefore, if neither of these possibilities occur, the volume of plastic so calculated and used will set to the exact height desired. However, if the volume of the hole is unknown or if the formation accepts the fluid plastic through fractures or connected porosity, the dumped volume is proportionally less than sufficient and subsequent dumps must be made. This manner of approach is a precautionary measure that has proved desirable in field practice. In some cases it has no doubt prolonged the time element beyond the minimum of 72 hours for pulling a well, cleaning, running a single plug and returning the well to production, but it has allowed highly accurate disposition of the plastic where the tendency to have overestimated the requirements of a well would have been understandable.

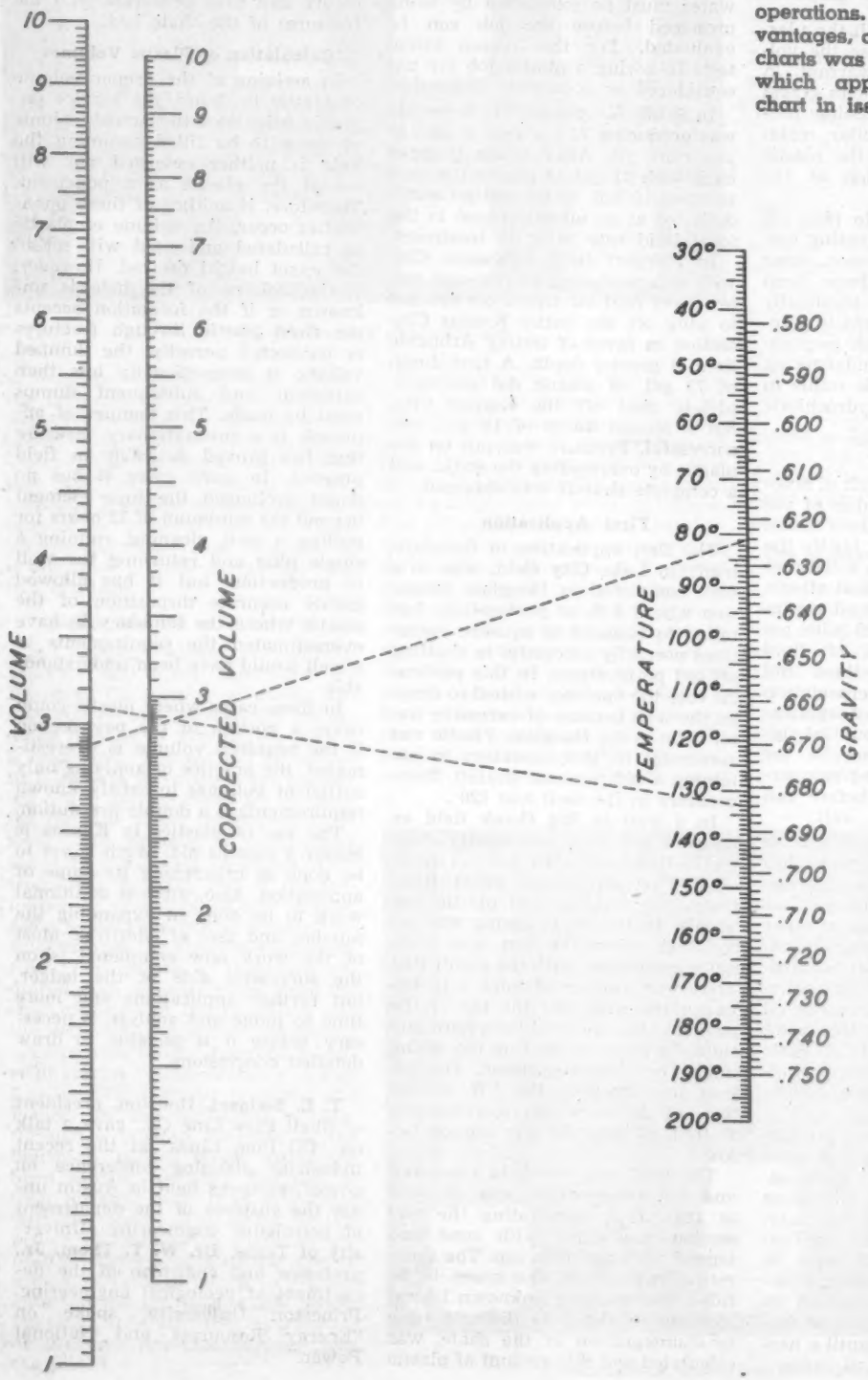
In those cases where plastic could cover a portion of the pay section if the required volume is overestimated, the practice of applying only sufficient volumes to satisfy known requirements is a double precaution.

The use of plastics in Kansas is barely 6 months old. Much is yet to be done in broadening its scope of application. Also, there is additional work to be done in expanding the number and uses of additives. Most of the work now completed is on the successful side of the ledger, but further applications and more time to judge and analyze is necessary before it is possible to draw detailed conclusions.

T. E. Swigart, Houston, president of Shell Pipe Line Co., gave a talk on "Oil Pipe Lines" at the recent industrial planning conference on power resources held in Austin under the auspices of the department of petroleum engineering, University of Texas. **Dr. W. T. Thom, Jr.,** professor and chairman of the department of geological engineering, Princeton University, spoke on "Energy Resources and National Power."

Chart for Correcting Natural Gas for Specific Gravity and Temperature

This is the third of a group of five alignment charts prepared by W. D. Parkes, United Gas Pipe Line Co., for the solution of field problems in natural-gas pipe-line operations. The purposes, advantages, and procedure of these charts was explained in an article which appeared with the first chart in issue of March 17, 1945.



Example:
Volume = 3,100 M.c.f.
Gravity = 0.684
Temperature = 81°

Required:
Volume corrected for gravity and temperature.

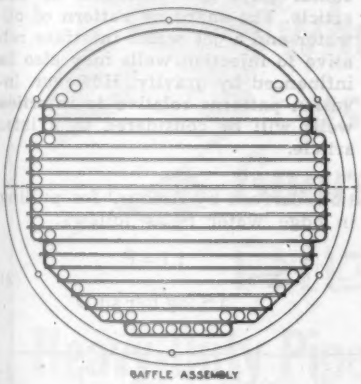
Solution: (as indicated by broken lines)
Volume corrected for gravity = 2,900 M.c.f.
Volume corrected for gravity and temperature = 2,840 M.c.f.

PLANT PRACTICES

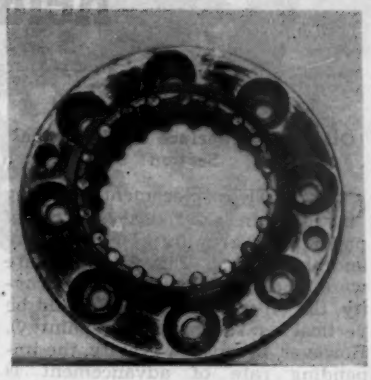
Repairing Worn Exchanger Baffles

SEVERAL crude exchangers were showing very poor efficiency; examination revealed that the outer rings of the baffles, the portion next to the shell, were corroded almost entirely away, allowing the shell stream to pass direct along the inside of the shell from inlet to outlet with practically no contact, with the inner tubes. To entirely dismantle the bundles and install entirely new baffles is a long and onerous task. The solution was found in the following manner:

Bundles were removed from shells, dimensions of the outer ring portion, its widths at different crucial points were determined very carefully. From templates sheets of ¼-in. thickness were cut into rings of the



required dimensions, as shown in the drawing. These rings were then cut in two at the heavy dotted lines at diametrically opposite sides of the ring. These halves were fitted carefully around the bundles at the position of the remaining parts of each baffle and welded together to form a continuous ring, also welded to the inside portions of the old baffles. By this system complete baffles were made which stepped up the exchanger efficiency to approximately normal capacity.



permissible stage for a type such as the "Fast's" design, a good repair method has been worked out as follows:

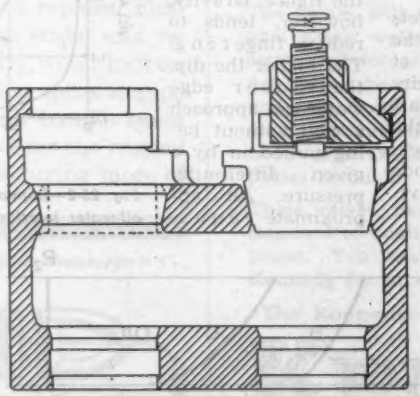
The worn teeth are all machined off, leaving smooth male and female cylindrical surfaces; these surfaces are built up by welding to oversize, and are then machined down to the desired loose fit, one within the other. Evenly spaced ¼-in. holes are drilled on this annular space with their centers exactly on the thin slot between male and female surfaces. Into these holes are fitted ¼-in. rods, just long enough to fill the holes, and the coupling is ready for long service. The photographs illustrate the job and the finished article.

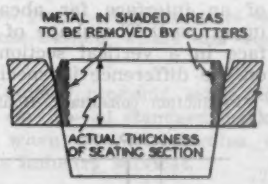
Rebuilding a Self-Aligning Coupling

SELF-ALIGNING couplings, of the toothed variety, of necessity wear the meshed teeth, the degree of wear depending in most cases on the degree of misalignment under which the coupling operates. When this wear has reached the maximum

Rebuilding Seats in Header Boxes

FINDING that the peculiar seats in header boxes of a certain design were "cutting out" rapidly in cracking still operation, a refinery engineering staff set about correcting the trouble. In the illustration the original plug seat was cylindrical as shown by the heavily shaded area. Three special cutters were made in the machine shop, of carefully determined dimensions as roughing cutters Nos. 1 and 2, and a finishing cutter. With these cutters, used in succession on large lathes, the seats were cut out to the lightly shaded boundaries, in taper form 10° from parallel. The plugs were cut down via lathe to the same careful taper, the exposed end being undercut and an alloy steel cup or cover pressed on, thus exposing only the alloy steel to the action of the hot cracked charge oil. The dimensions on this particular job are not important; any other size or arrangement of depth, angles, etc., to fit a given header being as satisfactory if the finished job gives the required protection and long life.





HEADER BOX SEATING SECTION

(The ideas described on this page are used in Pure Oil Co.'s Toledo, Ohio, refinery)

Displacement of Water by Gravity Relative to Oil and Gas

*by Park J. Jones**

Mechanics of Producing Oil, Condensate, and Natural Gas

PART 25 IN A SERIES

The shape of an oil-water interface is influenced by gravity. An oil-water interface can approach a well up to a point. Beyond that point, water is fingered into a well against gravity by the pressure drawdown in the well. The distance over which fingering occurs can be estimated only aside from the drawdown required to overcome the resistance across liners, perforations, plugged screens, and the resistance imposed by mud and paraffin. Equations for linear and radial displacement by gravity of water and oil relative to a gas phase in approximately horizontal pays are included in this article. The shape or pattern of oil-water and a gas-water interface relative to injection wells may also be influenced by gravity. However, invasion patterns relative to injection wells will be considered in a later article.

Oil-Water Interface in a Vertical Section

CONSIDER displacement of oil by water in a vertical section of pay having a uniform permeability and thickness h, Fig. 25-1. If there were no displacement of oil by gravity, the oil-water interface would be vertical as shown at the point O. However, because of gravity, the impending rate of advancement is faster at the bottom than at the top. The magnitude of the difference may be determined as follows: Let the pressure on top of the pay be P_1 at O and P_2 at L where L is the distance measured from O. The rate of oil advancement U_T in feet per day along the top of the pay is proportional to the pressure difference, that is

$$U_T \propto \Delta P$$

But the rate of advancement U_B along the bottom of the pay is proportional to the pressure difference along the bottom of the pay, that is

$$U_B \propto \Delta P + 0.433\, h\, \Delta S$$

where h is the pay thickness and ΔS the specific gravity of water less that of a reservoir liquid.

Hence, the ratio of bottom to top impending advancement rates is defined by

$$U_B/U_T = 1 + 0.433\,\frac{h\,\Delta S}{\Delta P} \qquad (1)$$

Fig. 25-2 is a solution of Equation 1 for h Δ S equal to 1 and 10, respectively.

But, if an oil-water interface gets ahead along the bottom of a pay, the effect of gravity is diminished at the bottom. Consequently, gravity alone cannot advance the lower part of an interface far ahead of the upper part. The shape of an interface in a vertical section depends on the difference in specific gravities, pay thickness, and producing rates. For comparatively thin pay, the shape is probably something like A in Fig. 25-1. For thick pays and slow producing rates, the shape may be something like C. The effect of dip is to make the shape more vertical.

Oil-Water Interface in a Plan View

Fig. 25-3 illustrates the shape of an oil-water interface in a plan view. The interfaces are for uniform and non-dipping beds. The permeability/viscosity ratio for water equals that for reservoir liquid. If the viscosity of a reservoir liquid is higher than that of water, fingering of edge water is more pronounced than in the figure. Gravity, however, tends to reduce fingering. The higher the dip, the closer edge water can approach a well without being pulled in by a given differential pressure. An approximate equation, derived by Arthur,[1] for pulling in edge water is as follows:

$$X = \frac{1.1\,\Delta P}{\Delta S \log R/r \sin D} \qquad (2)$$

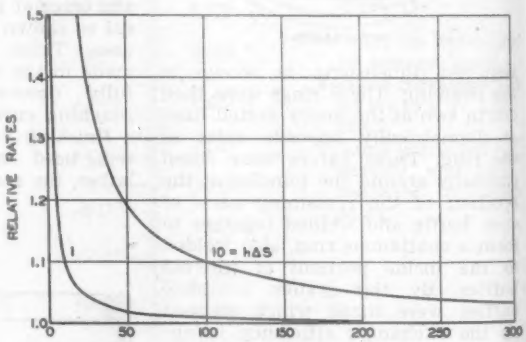


Fig. 25-2—Impending relative rate of advancement of a vertical oil-water interface; rate at bottom of pay/rate at top of pay

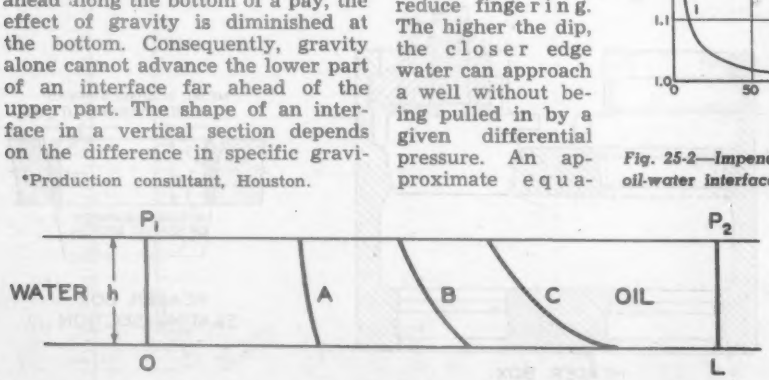


Fig. 25-1—Illustrating possible shapes of oil-water interfaces in a vertical section

where

ΔP = drawdown, psi.
ΔS = specific gravity difference between water and reservoir liquid
D = dip, degrees
R = distance to original water contact, ft.
r = radius of well bore, ft.

*Production consultant, Houston.

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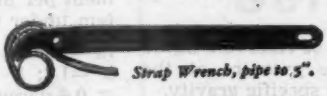

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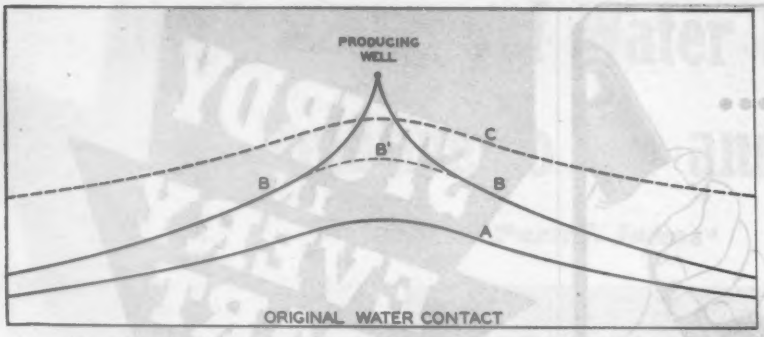

Fig. 25-3—Illustrating fingering of edge water into a well. After Muskat

X = distance to encroaching edge water, ft.

If edge water encroaches closer than the distance X given by Equation 2, the probability is that water will be pulled into a well by the pressure difference Δ P. The drawdown is exclusive of any pressure difference caused by mud, liners, perforated casing, and plugging in the neighborhood of well bores.

If we let

$$A = \Delta S \log R/r \sin D$$

Equation 2 becomes

$$X = 1.1 \Delta P/A \qquad (3)$$

The lines in Fig. 25-4 are solutions of Equation 3 for several values of A. It should be noted that the drawdown in Fig. 25-4 does not include any of the differential pressure which does not affect the oil-water interface.. For example, if the drawdown is 400 psi. and 90 per cent of it is dissipated at the well bore because of mud, only 10 per cent of the drawdown or 40 psi. is effective toward pulling in water. Only the pressure differential extending down dip in accordance with Darcy's law for radial flow is effective towards fingering edge water into a well against gravity.

In Fig. 25-3, X is the distance from the well to the oil-water interface at (B'). When the distance from B' up to the well is about equal to X, the oil-water interface changes from B-B'-B to B-well-B.

With respect to water coning upwards into a well, the general rule is Δ P = y. If the drawdown Δ P in pounds per square inch equals the vertical distance y ft. to water, the drawdown will cone in the water. For example, if a well is drilled to within 20 ft. of bottom water, a 20-psi. drawdown will, as a general rule, cone in water if there be no impermeable layers between the total depth and the water contact.

Oil Recovery vs. Fingering of Edge Water

Time is a factor in oil recovery with the help of gravity. The closer edge water can approach a well, the higher the oil recovery before water fingers in. Other things equal, the slower the producing rate from a well, the higher the recovery of oil because of gravity. Other things equal, oil recovery is proportional to the area under the curves in Fig. 25-3. For example, if a given producing rate fingers in water as indicated by curve B, oil recovery at the time water fingers in is proportional to the area under curve B. But, if at a slower rate the oil-water interface approaches the well as indicated by curve C, the oil recovery at the time edge water fingers in is proportional to the area under curve C.

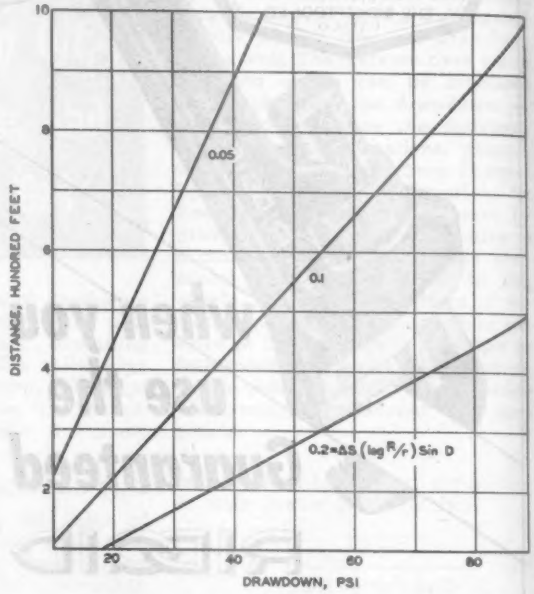

Fig. 25-4—Illustrating the distance that differential pressure can pull edge water into a well against gravity

Displacement by Gravity in a Linear System

Displacement of oil by gravity in a linear system having a free surface may be derived as follows: Let pressure at the base of the upstream end be denoted by P_1, and at the downstream end, by P_2. The equivalent pressure heads are defined by

$$P_1 = 0.433\, h_1 S \text{ and } P_2 = 0.433\, h_2 S$$

where

h_1 and h_2 are feet of reservoir liquid equivalent to the pressure at the base of a pay S = specific gravity.

The area through which oil can be displaced is given by

$$A = h_1 W$$

where W is the width of a linear system.

Relative to the constant area ($h_1 W$), the pressure difference across a length L is defined by Muskat as proportional to

$$h_1 - \frac{h_1^2 + h_2^2}{2h_1} = \frac{h_1^2 - h_2^2}{2h_1}$$

Accordingly

$$\frac{\Delta P}{L} = 0.433 S \left(\frac{h_1^2 - h_2^2}{2h_1 L}\right)$$

Substitution of the foregoing values in Darcy's law for a linear system gives

$$\frac{Q}{W} + 0.244 \frac{SK}{\mu b L}(h_1^2 - h_2^2) \qquad (4)$$

where Q/W is the rate of oil displacement by gravity in barrels per day per foot width at right angles to a linear system. The value h_1 and h_2 are pressure heads at the base of a pay. They are not the elevation of the free surface relative to the bottom of pay. Equation 4 is for displacement of oil or water by gravity relative to a gas phase. An application of Equation 4 will now be illustrated.

Example No. 1

Estimate the rate of oil displacement per unit width of a linear system under the following conditions:

h_1 = 50 ft.; h_2 = 10 ft.; L = 660 ft.; b = 1.2; S = 0.76; μ = 2.0 cp.; K = 0.4 darcys.

In this example: $h_1^2 = 2500$; $h_2^2 = 100$; and $(h_1^2 - h_2^2) = 2400$.

Accordingly,

$$\frac{Q}{W} = 0.244 \frac{0.76 \times 0.4}{2 \times 1.2 \times 660}(2400)$$

= 0.113 bbl. oil/day/ft. of width.

If the width W is 660 ft., the area is 10 acres. For the conditions in the above example, gravity is displacing oil at the rate of 0.113 × 660 or 74.5 bbl./day under the 10 acres.

Gravity and Pressure in a Linear System

Consider a pay having a thickness h ft. Let one end of the pay be under pressure h_1 ft. of reservoir liquid, where h_1 is greater than the pay thickness h. The rate of oil displacement for the pressure and gravity combined[2] is obtained as follows: The average pressure-head difference is given by

$$h_1 - \frac{h^2 + h_2^2}{2h} = \frac{2h_1h - h^2 - h_2^2}{2h}$$

Hence

$$\frac{Q}{W} = 0.244 \frac{SK}{\mu bL} (2h_1h - h^2 - h_2^2) \quad (5)$$

An application of Equation 5 is illustrated by Example No. 2.

Example No. 2

Estimate the rate of oil displacement for the conditions of Example No. 1 if pay thickness equals 50 ft. and the upstream pressure at the bottom of pay is 33 psig. Under these conditions,

$$h_1 = 33/(0.433 \times 0.76) = 100 \text{ ft.}$$

$$2h_1h = 2 \times 100 \times 50 = 10{,}000$$
$$h^2 = 50 \times 50 = 2500$$
$$h_2^2 = 10 \times 10 = 100$$
$$2h_1h - h^2 - h_2^2 = 7{,}400$$

$$\frac{Q}{W} = 0.244 \frac{0.76 \times 0.4}{2 \times 1.2 \times 660} (7{,}400)$$

$$= 0.346 \text{ bbl./day/ft.}$$

If W = 660, Q = 0.346 × 660 = 228 bbl./day under 10 acres.

Displacement by Gravity Into a Well

Darcy's law for radial displacement of oil into a well by pressure is defined by

$$Q = \frac{3.07 K h \Delta P}{\mu b \log R/r} \quad (6)$$

where

Q = bbl. of oil per day
h = pay thickness, ft.
r = radius of well bore, ft.
R = average distance to ultimate source of reservoir liquid, ft.
ΔP = pressure difference across the distance R — r, psi.

Displacement of oil by gravity into a well may be derived as follows: Let the pressure at the base of a pay in a well bore be P_r. The

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With kindest personal regards and best wishes,

I remain

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equivalent reservoir liquid head is defined by

$$P_r = 0.433\ h_r\ S$$

Similarly, let pressure at the distance R ft. from the axis of a well bore be denoted by P_R. The equivalent reservoir liquid head is defined by

$$P_R = 0.433\ h_R\ S$$

But the average pressure-head difference[2] is

$$h_R - \frac{h^2_R + h^2_r}{2h_R} = \frac{h^2_R - h^2_r}{2h_R}$$

Hence

$$\Delta P = 0.433S \cdot \left(\frac{h^2_R - h^2_r}{2h_R}\right)$$

and Equation 6 for radial displacement by gravity into a well becomes

$$Q = 0.665\ \frac{S\ K\ (h^2_R - h^2_r)}{\mu b \log R/r} \qquad (7)$$

Equation 7 is for displacement of oil or water by gravity relative to a gas phase. Its application is illustrated by Example No. 3.

Example No. 3

Estimate the rate of oil displacement by gravity into a well under the following conditions:

Specific gravity of reservoir liquid = 0.76.
Effective permeability = 400 md.
Operating fluid level in well bore relative to bottom of pay = 20 ft.
Diameter of well bore = 6 in.
Distance between wells = 660 ft.
Viscosity of reservoir liquid = 4.0 cp.
Volume factor = 1.2.
Head of reservoir liquid at 660 ft. = 40 ft.

In this example:

$\log R/r = 660/¼ = 3.42$
$h^2_R - h^2_r = 1{,}600 - 400 = 1{,}200$

$$Q = 0.665\ \frac{0.76 \times 0.4 \times 1{,}200}{4 \times 1.2 \times 3.42}$$

$$= 14.8 \text{ bbl./day}$$

Gravity and Pressure for a Well

Consider a pay having a thickness h ft. Let the pressure at R ft. from a well be h_R ft. of reservoir liquid relative to the bottom of the pay. The average pressure head is given[2] by

$$h_R - \frac{h^2 + h^2_r}{2h} = \frac{2\,h\,h_R - 2^2 - h^2_r}{2h}$$

Hence, the displacement into a well by pressure and gravity combined becomes

$$Q = 0.665\ \frac{S\ K\ (2\,h\,h_R - h^2 - h^2_r}{\mu b \log R/r} \qquad (8)$$

An application of this example is illustrated in Example No. 4.

Example No. 4

Estimate the rate of oil displacement into a well for the conditions in example three if the pay thickness is 40 ft. and the pressure at the base of the pay is 37 psig. In this case

$h_R = 37/(0.433 \times .76) = 110$ ft.
$2\,h\,h_R = 2 \times 40 \times 110 = 8{,}800$
$h^2 = 1{,}600$
$h^2_r = 100$
$2h\,h_R - h^2 - h^2_r = 7{,}100$

$$Q = 0.665\ \frac{0.76 \times 0.4 \times 7{,}100}{4 \times 1.2 \times 3.42}$$

$$= 87{,}5 \text{ bbl./day}$$

References

1. Arthur, M. G., A.I.M.E., 1944.
2. Muskat, M., Flow of Homogeneous Fluids, McGraw-Hill Book Co.

BOOKS

DRIVING DIESELS. Compiled and edited by the editorial staff of the Petroleum Educational Institute. G. A. Zamboni, managing director. Los Angeles. 68 pp. $2.

This volume presents in a pictorial, nontechnical manner the basic fundamentals drivers of automotive diesels should apply if they are to secure what is considered today good over-the-road operation. Operators of high-speed diesel equipment will be interested to learn that this book provides a practical training program which drivers can readily understand and apply. Liberal use is made of homely illustrations to assist the nontechnical reader.

IMPROVEMENT OF LABOR-UTILIZATION PROCEDURES. Bulletin No. 807 of the United States Department of Labor, Bureau of Labor Statistics. 44 pp. 10 cents per copy from Superintendent of Documents, U. S. Government Printing Office.

This bulletin is written from the standpoint of plant management, and should be of value to many employers who are in search of improved labor-utilization procedures.

AMERICAN MALLEABLE IRON—A HANDBOOK. Published by Malleable Founders' Society, Union Commerce Building, Cleveland. $4.

Full discussion of malleable iron, from its chemistry, metallurgy, and manufacture to its applications in various fields is offered in this handbook. The volume brings together complete data on present manufacturing procedures and most recent standards and practices. Chapters on casting design, pattern design, and machining practice are included and offer a store of practical data which will be of interest and direct usefulness to designing engineers and production men. Physical, mechanical, and engineering properties of standard, pearlitic, and alloyed malleables are set forth and are correlated with requirements for the product as set up by A.S.T.M., the Army and Navy, and other agencies responsible for current specifications. A large section is devoted to engineering tables and data, including a tabular summary of A.I.S.I., S.A.E., and N.E. steels and irons of comparable characteristics.

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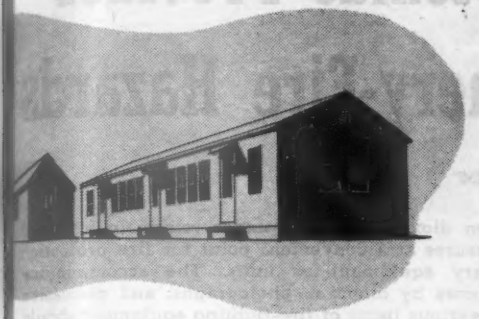

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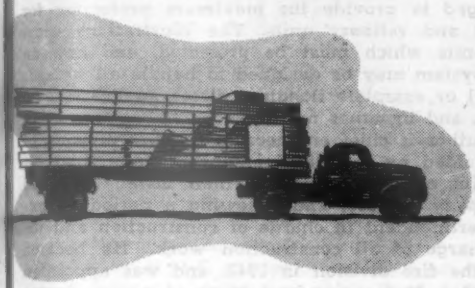

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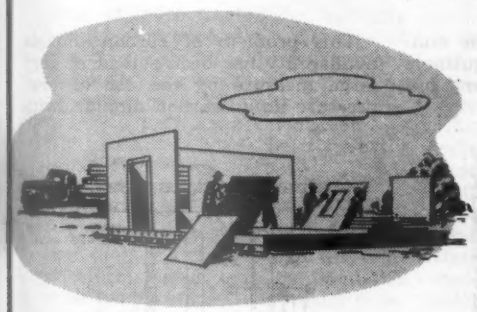

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Low-Pressure Carbon Dioxide Provides Protection Against Refinery-Fire Hazards

by H. B. Harper

Carbon dioxide is stored under relatively low (300 psi.) pressures at a convenient point for fire protection of refinery equipment or units. The accompanying article shows by diagram, photographs, and discussion how the various items of fire-fighting equipment should be arranged to provide the maximum protection for personnel and refinery units. The illustrations show typical units which must be protected, and how an over-all system may be designed to handle all hazards by partial or complete flooding, direct application, by hose reel, and by other means.

The author is chief engineer of the fire division of Cardox Corp., upon whom, aided by a staff of engineers, falls final responsibility for the engineering of Cardox systems, their installation, and service. He joined the company in 1939, and following a period of experimental work and as superintendent in charge of construction and installation, was placed in charge of all construction work. He became assistant chief engineer of the fire division in 1942, and was appointed to his present job a year later. Harper received his engineering degree from University of Florida in 1935.

As a fire-extinguishing medium for petroleum-industry hazards, carbon dioxide has certain very definite and unique advantages over other commonly used agents. It will extinguish all types of petroleum fires, even running fires involving highly volatile products. For flammable liquid fires it is probably the fastest of all extinguishing mediums. An example are the huge trucks used at major air fields today which extinguish raging fires fed by hundreds of gallons of aviation gasoline, often in a matter of seconds. Carbon dioxide does not contaminate unburned material nor does it damage equipment. It leaves no residue to be cleaned up. It is not a conductor of electricity.

Yet only within the last few years has carbon dioxide begun to come into its own for fire protection in petroleum and allied industries. This was a natural result of the fact that the supply of carbon dioxide contained in available extinguishers was simply too limited for any but relatively small fires.

This problem of carbon dioxide availability has been solved in very large measure by the use of low-pressure liquid carbon dioxide, with

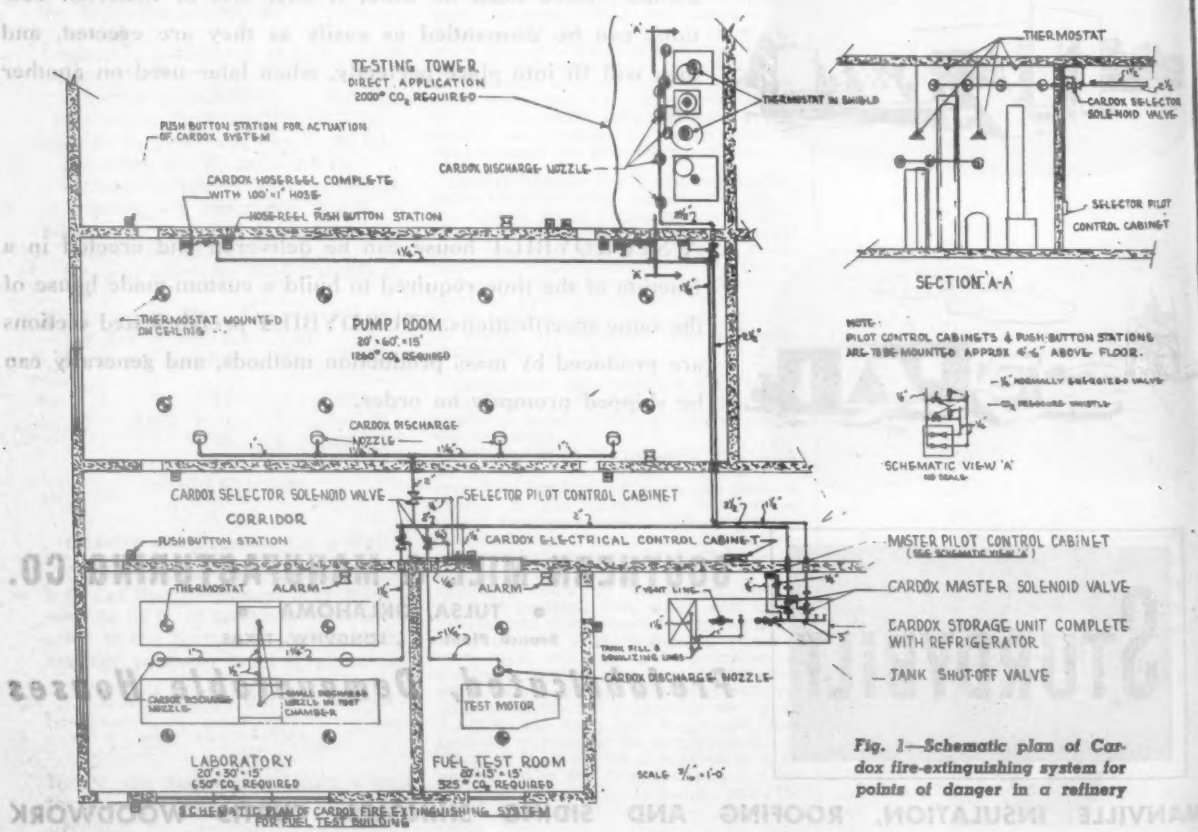
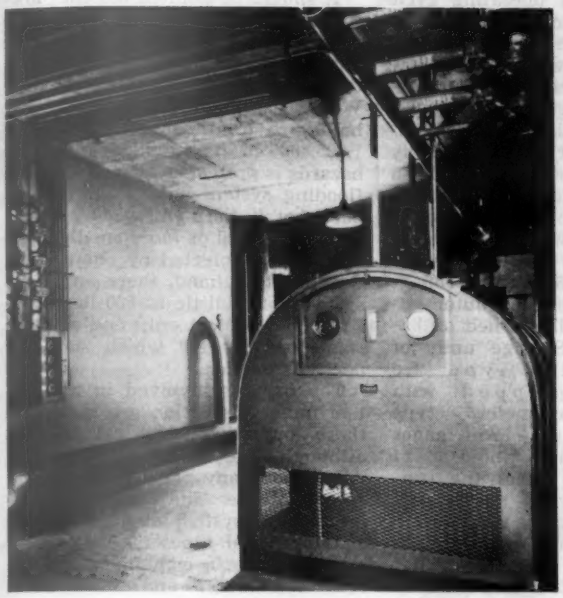
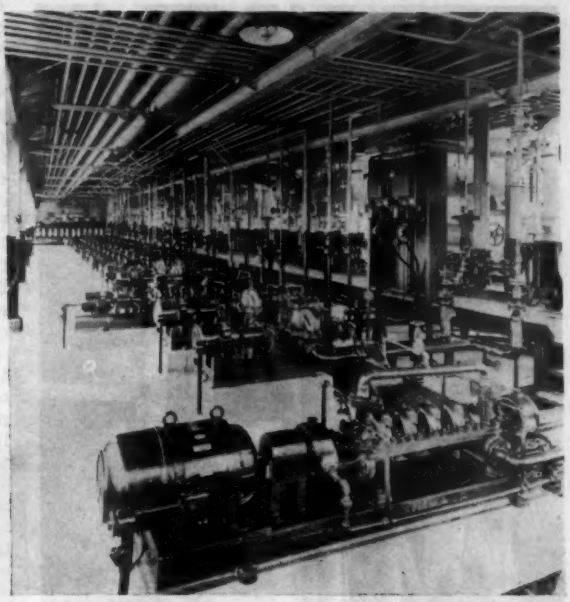


Fig. 1—Schematic plan of Cardox fire-extinguishing system for points of danger in a refinery





Left: Typical storage unit of a low-pressure carbon-dioxide fire-extinguishing system. In this unit 10 tons of liquid carbon dioxide are maintained at 0° F. and approximately 300 psi. Right: Total flooding concentration of approximately 45 per cent is provided for the entire pump room. Direct application by hose reel is provided for small fires which may occur

tons of carbon dioxide instantly available if necessary. The size of fire that can be extinguished has obviously increased many fold. At the same time the scope of usefulness and performance value of carbon dioxide have been greatly broadened.

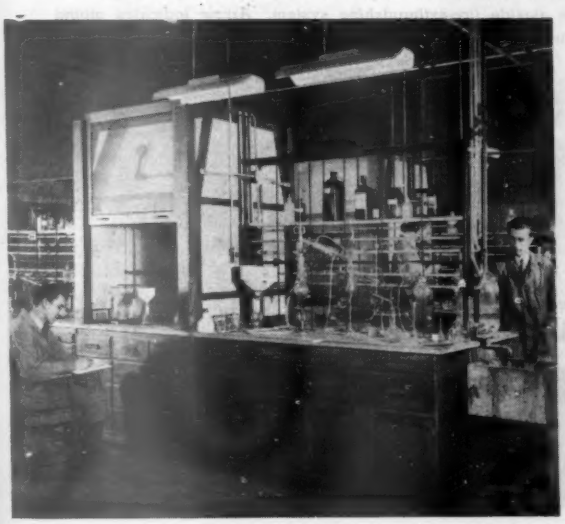
Low-Pressure Carbon Dioxide

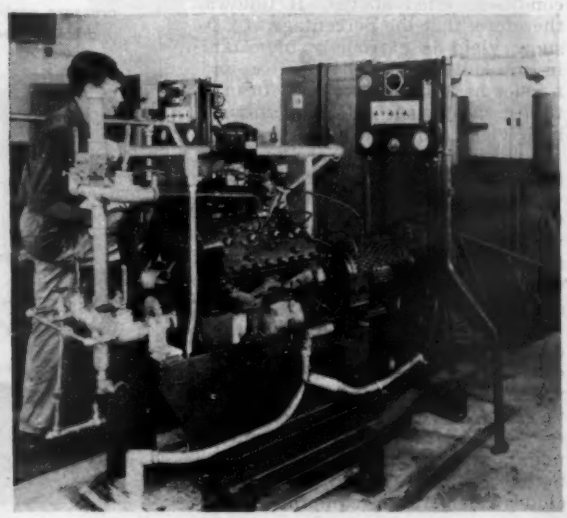
The vapor pressure of liquid carbon dioxide depends upon its temperature; that is, pressure fluctuates with temperature. A normally filled cylinder of carbon dioxide at 70° F. will have a pressure of approximately 840 psi.; at 100° F. a pressure of about 1,460 psi. By refrigerating the carbon dioxide to 0° F. the pressure is reduced to approximately 300 psi.

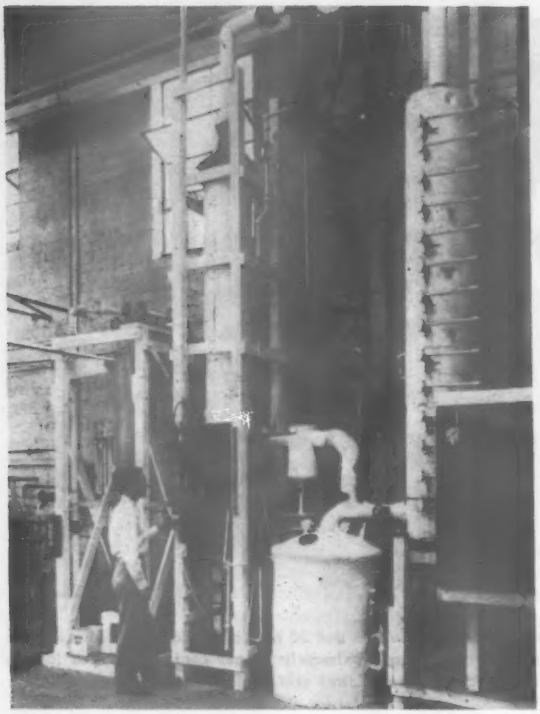
Low-pressure carbon dioxide has enhanced fire-extinguishing properties. In the first place, it has uniform characteristics regardless of surrounding temperatures since it is held at constant temperature. Constant temperature and pressure assure constant rate and duration of discharge in accordance with engineered design of application by means of fixed systems or mobile equipment.

When liquid carbon dioxide is released or discharged to atmosphere, a portion of it vaporizes while the rest becomes CO_2 "snow"—finely divided particles of dry ice with a temperature of —110° F. The discharge forms an inert blanket which envelopes the burning material and reduces the oxygen concentration to a point which will no longer support combustion. At the same time, particles of snow settle on the hot surface and absorb heat in subliming.

Left: Direct application is supplied to test benches in laboratory, with small-diameter piping terminating in orifice nozzles extended into test cabinets themselves to protect equipment within. Right: Protection of hazards in engine test room is by a combination of direct application and total flooding







Testing towers protected by direct application and total flooding to isolate this particular area within a larger enclosed area

The cooling effect quickly reduces the rate of distillation of volatile vapors which are also essential for combustion.

The percentage of CO_2 snow formed in the discharge is greater when the liquid carbon dioxide is maintained at low temperature. For example, liquid carbon dioxide released at 80° F. produces 24 per cent snow, whereas released at 0° F. it produces 47 per cent, by weight. The effective cooling capacity of carbon dioxide is proportional to the percentage of snow formed (the ratio is approximately 2 to 1 under the conditions cited above). It follows, therefore, that the percentage of CO_2 snow yield is extremely important in the extinguishment of fire and nozzles have been developed to take fullest advantage of the uniform high yield achieved.

Solid carbon dioxide or CO_2 snow is about 500 times as dense as CO_2 vapor. It can, therefore, be projected through a much greater distance without being affected by the air turbulence frequently encountered with large fires and always a consideration in outdoor fire fighting.

In low-pressure liquid carbon-dioxide systems the liquid carbon dioxide is stored in relatively thin-walled, thermally insulated pressure vessels of any required capacity. The temperature of the stored liquid is maintained at 0° F. and approximately 300 psi. The storage unit includes refrigerating equipment with an operating cycle controlled by pressure switch. When pressure within the vessel rises to approximately 305 psi., the refrigerator is automatically turned on. When enough heat has been removed to lower the pressure to approximately 295 psi., the refrigerator is automatically turned off.

Storage units of this type are equipped with manometer-type liquid-level gages which indicate at all times the supply of stored carbon dioxide in the tank. Appropriate pressure-relief valves and a safety disk are also a part of the unit assembly. A typical storage unit is shown in an accompanying photograph.

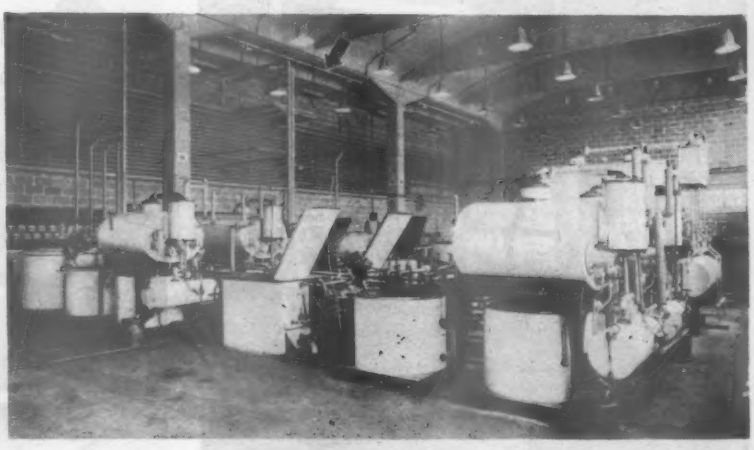
The following description of a typical low-pressure carbon-dioxide system as engineered for the protection of four representative refinery hazards may serve to illustrate the functioning of such a system as well as some of the types of application which can be provided. Photographs show each of the hazards. They have been grouped for convenience as illustrated on the accompanying plan drawing. An additional illustration has been included showing the piping and nozzle arrangement in a protected oil-reclamation room in a war plant.

It should be pointed out that low-pressure carbon-dioxide systems are frequently very much larger in size and the number of hazards covered than the one under discussion. One West Coast building, for example, having a total content volume of 1,605,400 cu. ft. divided into four hazards is protected by a single total flooding system with a storage capacity of 40 tons, while it is not uncommon for 20 or more smaller hazards to be protected by one system. On the other hand, there are many systems of as little as 500-lb. capacity which protect only one or more small hazards for which such capacity is ample.

The hazards involved in the system under discussion are typical of those found in a fuel-test building although the individual hazards might be in any plant, either singly or in multiple. The Cardox fire extinguishing system as laid out includes several types of application: total flooding, a combination of direct application and total room flooding, a combination of direct application and total flooding by isolation, and direct application by hose reel. The system indicated is fully automatic with provision for standby manual-electric and manual operation. Automatic operation offers obvious advantages, although it is entirely possible to engineer systems utilizing merely manual or a combination of manual and manual-electric control.

The low-pressure carbon-dioxide storage unit of 2 tons specified follows the usual recommendation of capacity to provide double-shot protection for the hazard requiring the greatest amount of carbon dioxide to build an extinguishing concentration —in this case, the testing towers. This, in turn, gives double-shot protection for the pump room and allows a reserve supply for hose-reel

Oil reclamation room, one of nine large hazards protected by a single low-pressure carbon dioxide fire-extinguishing system. Arrow indicates piping and total flooding nozzles. (This hazard no part of system discussed here)



application when necessary. Multiple-shot coverage is thus available for the two smaller hazards. The capacity of the storage unit of any system is governed by the size and number of hazards, whether single or double-shot protection is required and whether reserve capacity for future extensions to additional hazards is planned.

The storage unit as shown is assumed to be located outdoors. The fill and equalizing lines which are used in filling the storage unit from transport trucks are shown as installed where there is a roadway adjacent. Where it is not possible to drive the transport truck to the storage unit these lines are extended to a suitable location.

Shut-Off Valve Control

Immediately above the tank housing in the dip tube and discharge line which extends to the bottom of the pressure vessel in the storage unit is a tank shut-off valve which is normally locked open. This valve is placed close to the outlet on the tank so that the latter may be shut off during service or extension to the system. Connected to the tank shutoff valve is the manifold header from which extend distributing lines supplying carbon dioxide to the various hazards. On the header it is possible to provide extra outlets as shown for hazards for which future protection may be required. The master control valves, solenoid operated, are installed on the header at the storage unit. In this way piping under pressure is kept to a minimum with all piping downstream of the master valves normally at atmospheric pressure. The master control valves operate electrically by means of solenoids, but in addition a pilot control cabinet is provided which allows these valves to be operated by carbon-dioxide pressure if ever necessary. The pilot control valve is normally located at hand level either on the unit or at a nearby point. This means of pressure operation enables large piping and control valves to be located near the ceiling, giving head room for other machinery and equipment.

From the master control valve the distribution header extends into the corridor. From it are branches to the individual hazards. Immediately adjacent to each hazard a selector valve is provided. This makes possible individual hazard application from one main header and one main control valve. Each of the selector valves is electrically operated and is provided with manual pilot valve for pressure operation similar to that used in connection with the master control valve. The hose reels for protection of the pump room have a separate header and master valve from the tank, making available hose-reel protection at all times regardless of actuation of the system and discharge into any other hazard.

Located at the tank in the pilot line is a normally energized valve wired in series with the main system fuse. If a power failure should occur, this valve becomes de-energized, opens and allows pressure to operate the master valve flooding the discharge header. At the same time a carbon-dioxide whistle in the pilot piping sounds to notify personnel of the power failure. The normally energized valve is provided primarily for power failures or power interruptions and its purpose is to have carbon dioxide in the main distribution system at such times in order that by simply operating the pilot control valve for the individual selector valves the hazards can be flooded.

The electrical system as shown is of the panel type with control for all four of the hazards located in the one control cabinet outside of and separated from the hazards proper. This precaution prevents damage to the control equipment which might result from fire at the actual hazard.

Mounted on the panel is a timer and a hazard and alarm relay for each hazard. Both the hazard and alarm relay are energized almost simultaneously with the actuation of the system, either through automatic detection or pushbutton operation. Closing these relays will complete

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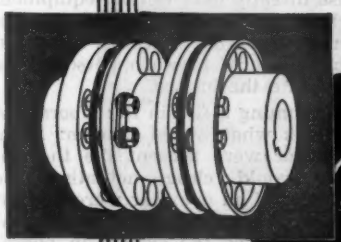

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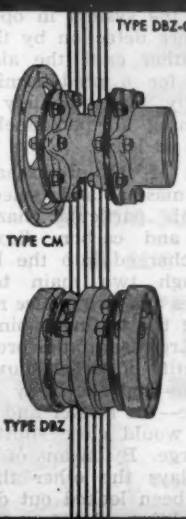

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some circuits while most of the circuits are completed through the timer to obtain the proper sequence of operation. The timer and relays thus control operation of the predischarge alarm, duration of discharge, lockout of thermostats and the opening and closing of the master-control valve and the selector valve for the hazard where fire exists. Auxiliary functions include shutdown of ventilating and exhaust fans, pumps and motors and the closing of doors and windows.

How the System Operates

When fire is detected by the thermostats, the system is automatically placed in operation. Should the fire be observed even before this automatic operation has been effected, a momentary pushbutton station provided at each door enables personnel leaving the hazard to actuate the system by manual-electric means. The system thereafter performs all of the automatic functions that have been described. The thermostats in each hazard are located in accordance with Underwriters' or insurance requirements. In rooms to be totally flooded they are placed according to set and established rules. Where direct application is provided in this system shielded thermostats are located not only on the ceiling as required by established practice, but also directly over critical equipment where potential fire danger exists. In all hazards, there is a predischarge alarm to warn personnel to evacuate the hazard.

Assuming a fire in the laboratory, here is what would happen: If no operator were present the thermostat would close, actuating the system. If an operator were present he would use the pushbutton station to place the system in operation even before detection by thermostat. In either case, the alarm would sound for a predetermined period (usually approximately 30 seconds) warning all personnel in the laboratory to leave.

At the end of the predischarge period, the master and selector valves for this particular hazard would open and carbon dioxide would be discharged into the laboratory through two main total flooding nozzles and two orifice nozzles protecting the testing cabinets. Following the release of the predetermined quantity of carbon dioxide into the room—approximately 650 lb. in this case—the master and selector valves would close shutting off the discharge. By means of the timer and relays the other three hazards have been locked out during this period in order to assure the full amount of the discharge within the timed period. Now that the discharge has stopped, fire in any one of these other hazards will

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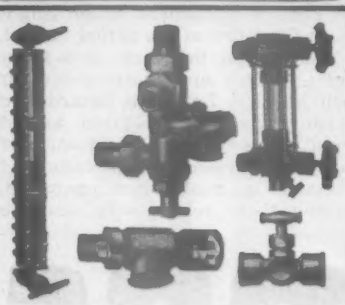

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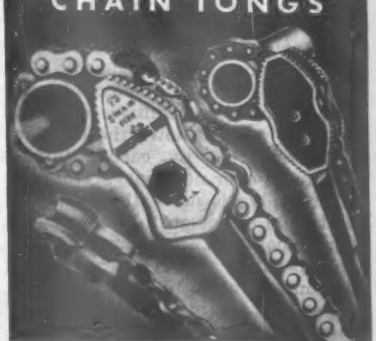

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cause the full sequence of automatic operation, but the laboratory in which the fire has just occurred will be locked out of automatic functioning. The thermostats in this hazard cannot actuate the system again until the room has been investigated. The purpose of this is to keep the system from recycling in case of fire severe enough to fuse the thermostat or cause a short circuit in the wiring.

Should another fire start in the laboratory before it has been investigated, the pushbutton station can be used to actuate this part of the system. After examining the room and determining the cause of the fire, the operator returns to the control panel and resets the system. Resetting places the thermostatic circuit back in operation.

Types of Application

Pump room.—In the pump room (see photograph and general plan) there is a series of fuel pumps extending down the approximate center of the room for its entire length with all auxiliary fuel piping overhead or on the side walls. For this room a total flooding concentration of approximately 45 per cent carbon dioxide is contemplated. This concentration is somewhat higher than the minimum N.F.P.A. requirements, but serves two purposes: It offers a factor of safety assuring positive extinguishment, and at the same time, allows for the contingency of possible excessive leakage of carbon dioxide out of the hazard for any reason.

Automatic protection is provided by thermostats, with push-button stations at four exit doors and a pilot valve for pressure operation in an emergency. Four nozzles properly located serve to provide the quantity of carbon dioxide necessary and to distribute it throughout the length of the room. The type of total flooding nozzle used here, in discharging, disperses the CO_2 snow and vapor throughout the area protected. Designed to create its own turbulence, this nozzle achieves effective distribution of carbon dioxide. The relationship of the high CO_2 snow yield resulting from the release of carbon dioxide at 0° F. to cooling effect has already been discussed.

In a pump room, fire may occur at a small piping leak or at one of the individual pumps and it may not be necessary to totally flood the room in order to extinguish the relatively small blaze. To deal with such fires during working hours when personnel is present two hose reels are indicated, each having 100 ft. of 1-in. carbon-dioxide hose. When the operator observes the fire he pushes the button which opens the hose-line master valve at the storage unit, allowing the carbon dioxide to enter the distribution header, and then opens the manual valve at each reel. With sufficient hose to reach any part of the room, operation of the playpipe valve at the hose line nozzle applies the carbon dioxide. The nozzle used is a specially designed projection type for direct application at a high rate of flow. The carbon dioxide snow is projected in a "core" through the center of the discharge and enveloped in carbon dioxide vapor. Effective projection through relatively great distance in the presence of strong air currents is accomplished and the CO_2 snow itself can be directed into the heart of the fire to provide effective cooling. In addition, as it vaporizes it builds additional fire-extinguishing concentration at those points where the fire is hottest and throughout the fire zone.

Laboratory.—In the laboratory (see photograph and general plan) there are two main laboratory benches and test cabinets. In engineering and protection for this room the main total flooding nozzles are extended by pipe line into the center of the room. Discharge is directed between the two cabinets to furnish direct application to test benches. Small-diameter piping ter-

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minating in orifice nozzles is extended into the test cabinets themselves in order to protect the equipment within. Except for this feature and the elimination of hose reels which are not needed in this hazard, the application is similar to that provided for the pump room, although it requires approximately half the amount of carbon dioxide because of the lesser volume protected.

Fuel or engine test room.—In the fuel or engine test room (see photograph and general plan) the main hazard is the test motor or motors. Therefore, the discharge of carbon dioxide is directed at the test motor proper which, from actual experience recorded in case histories, may be a special unit or an original model. This direct application to the motor is intended to extinguish the fire at this point within seconds. The discharge is then allowed to continue until the room has been totally flooded. Thus, the test motor itself is given dual protection and total flooding protection is provided for other apparatus in the room.

Testing towers.—The testing towers, gages and control panels (see photograph and general plan) are assumed to be located along the wall, probably in the corner of a large room. The apparatus occupies a rather large cubical volume. Nozzles are located to isolate completely and flood this cubical volume for a long enough period to extinguish the fire, and at the same time, provide direct application to localized critical danger points. The total flooding of this area within a larger area by isolation requires a greater quantity of carbon dioxide than the total flooding of enclosed hazards having larger actual cubical content. In the case of the testing towers hazard walls are not present to assist in retaining the carbon-dioxide concentration. Similar applications for hazards outdoors are frequently provided. Potential wind conditions in this case will require provision for greater quantities of CO_2, but will not normally otherwise reduce the extinguishing effectiveness of the mass discharge of carbon dioxide.

Protecting Testing Towers

For protection of the testing towers following the predischarge alarm period, application at a high rate is essential, with the entire 2,000 lb. of carbon dioxide required released in approximately 1½ minutes. To bring the liquid carbon dioxide from the storage unit to the nozzle will take approximately 5 or 6 seconds. It is estimated that in the case of any of the four hazards as located in the system under discussion, the maximum period required for this function is approximately 10 seconds.

In this particular installation the timing of the duration of discharge into each of the various hazards is approximately the same—1½ minutes with quantities of carbon dioxide released regulated by the distribution system and the size of nozzles. Many times, however, it is desirable to have the carbon dioxide discharged at a much slower rate. This can be accomplished by lengthening the discharge period and decreasing the rate of flow from the nozzles. This is done when it is necessary to retain concentrations over a considerable period of time to extinguish burning embers which may be present—as, for example, in the case of a record-storage vault.

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E. Lee Thackrey has joined the geological staff of American Trading & Producing Co.'s office in Midland, Tex.

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A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Vaporizer Temperature and Steam

THE vaporizer temperature at atmospheric pressure of a tower or flash chamber can be read directly from the flash vaporization curve (The Refiner's Notebook No. 37, April 7, 1945; No. 34 of March 17, 1945; and No. 24 of December 30, 1944, on Laboratory Crude Distillate) but corrections must be made for the pressure (or vacuum) in the vessel and for the partial-pressure effect of steam. Corrections for pressure or vacuum can be made directly by the vapor-pressure chart of The Refiner's Notebook No. 38 (April 14, 1945) but if steam (or other inert gas) is present the partial pressure in the gas space must be computed, and the partial pressure is used in place of the pressure on the vapor-pressure chart.

Partial pressure may be defined as the part of the pressure in the gas space that is caused by vaporization of the liquid. The partial pressure of each gas or component found in the gaseous mixture is directly proportional to the fraction (or part) of the volume occupied by that gas. Likewise, the partial pressure of each component is directly proportional to the number of molecules or mols of that component in the mixture. Thus:

$$\text{Partial pressure} = \frac{\text{V.P. of comp.}}{\text{total press.}} = \frac{\text{cu.ft. of comp.}}{\text{total volume}} = \frac{\text{mols. of comp.}}{\text{total mols}}$$

Each of these relationships is useful for some computations but the most generally useful one is—

$$p = \frac{O}{O + S}$$

in which:

O is mols oil vapor
S is mols steam (or inert gas)
p is partial pressure (a fraction)

The mols of a material (oil, steam, etc.) is obtain by dividing the pounds of the material by its molecular weight (m.w. of oils will appear in The Refiner's Notebook No. 47).

In using the partial pressure in place of pressure on the vapor-pressure chart of The Refiner's Notebook No. 38 for the purpose of correcting boiling-points, it is necessary to multiply the partial pressure (which is a fraction) by the total pressure.

1. No steam.—The flash curve of the crude oil of The Refiner's Notebook No. 31 (February 24, 1945) may be computed from the relationship of No. 37 (April 7, 1945) as follows:

70% pt.	800° F.
10% pt.	232° F.
	568° F.

Slope of Flash Curve is 6.7°/%.
50% pt. on T.B.P. is 614.
50% pt. on Flash is 46° F. lower or 568° F.
0% pt. on Flash Curve is 568 — 6.7(50) = 233° F.
100% pt. on Flash Curve is 568 + 335 = 903° F.

To vaporize the 51 per cent (gas, gasoline, kerosene, and distillate) would require a temperature of 575° F. at atmosphere pressure:

$$568 + 6.7(51 - 50) = 575° \text{ F.}$$

If the pressure at the vaporizer of the topping tower were 10 psi. gage the 575° F. would, according to the figure on this page, increase to 620° F. The same computation can be made by the use of the vapor-pressure chart of The Refiner's Notebook No. 38 (April 14, 1945) by correcting the temperature of 575° at atmospheric pressure to the temperature (620° F.) at 10 psi. (24.7 psia.).

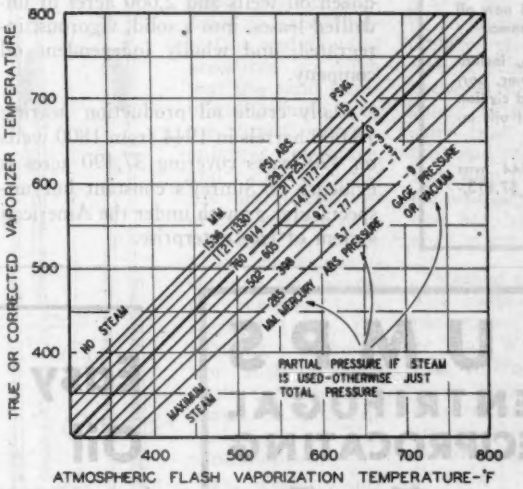


Fig. 1—Approximate effect of pressure and steam on the vaporizer temperature of topping towers

2. With steam.—Usually steam is used, at least to the extent of stripping steam. If the above crude oil is handled in the amount of 4,000 bbl. per day, the mols of vapor is 159.9 and the mols of steam (0.5 lb. per gallon of topped crude) is 95.5. The computation of such quantities will be discussed in future installments. The partial pressure is:

$$p = \frac{159.9}{159.9 + 95.5} = 0.626$$

Or expressed in pounds per square inch for a tower pressure of 10 psig. (24.7 psia.):

$$0.626 \times 24.7 = 15.5 \text{ psia.}$$

According to either the vapor-pressure chart or the figure on this page, the vaporizer temperature of 575° F. corrected to 15.5 Abs. is 581° F.

No. 39 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

SUNRAY OIL CORPORATION TULSA, OKLAHOMA

THE RECORD AT A GLANCE

SUNRAY ASSETS total $33,507,877. The company is owned by 20,000 stockholders and operated by 500 employees.

In 25 years Sunray stockholders have received $5,705,477 in cash dividends, and 6 dividends paid in common stock. In 1944 dividends of 20c per share were paid on the common stock.

TAXES took 30c of every gross dollar earned in 1944, averaging 23.2c for each share of common stock.

In 1944 SUNRAY opened 5 new oil pools in Kansas and Oklahoma.

SALES of refined products, including aviation naphtha, codimer, paraffinic naphtha, military and civilian gasoline, and industrial fuel oils increased 9.5% over 1943.

GROSS INCOME for 1944 was $11,361,293 compared to $7,813,454 in 1943.

Observes its 25TH YEAR OF OPERATIONS

When the SUNRAY OIL CORPORATION was incorporated twenty-five years ago it had—a charter and an idea.

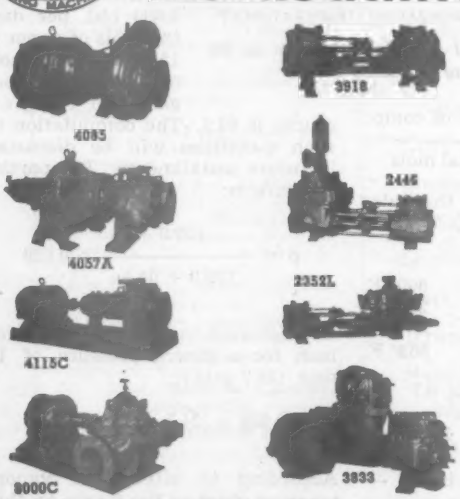
The idea of the small group of original incorporators was to build the little company, with total assets of half a dozen oil wells and 2,000 acres of undrilled leases, into a solid, vigorous, integrated, and wholly independent oil company.

Daily crude oil production nearing 18,000 barrels in 1944 from 1800 wells on 490 leases covering 37,490 acres is evidence of Sunray's constant but unspectacular growth under the American system of free enterprise.

Of 110 wells drilled or participated in by the company in 1944, 77 were producers, 33 dry. Undrilled acreage in 13 mid-continent states totals in excess of 400,000 acres. Sunray's production of petroleum for the year amounted to 5,656,729 barrels.

The volume of fuels vital to victory, components of 100-octane aviation gasoline, was increased by the company in 1944 with the installation of additional facilities at its modern, 12,000-barrel refinery in Oklahoma. Postwar, however, these facilities will enable the company successfully to compete with larger catalytic cracking plants in the manufacture of high-octane civilian gasoline.

PUMPS
CENTRIFUGAL
RECIPROCATING



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

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Easy Oil

One JENSEN Unit would soon make you dissatisfied with any other way to lift oil. These Units incorporate every improvement developed by ourselves and our customers in the 25 years we have made and sold pumping equipment.

It is difficult to interest any producer satisfied with the pumping equipment he has. We know that. But the facts about JENSEN Units are interesting information for any producer. Why not see your JENSEN dealer, talk with JENSEN owners, observe JENSEN installations and consult Composite Catalog pages 1473-6? You'll thank us for being so persistent.

JENSEN
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Coffeyville, Kansas, U. S. A.

Export Office: 50 CHURCH STREET, NEW YORK CITY

Use of Gravel as a Screen for Unconsolidated Oil Sands

ADVANTAGES of gravel screens. Pea-sized gravel has been used successfully to take the place of a wire screen and to fill the annular space between the perforated pipe and face of an oil sand. This method of finishing an oil well is called "gravel packing." Gravel packs generally can be made at moderate cost and have several advantages. In wells where the oil sand is exceedingly fine and loose and the sand flows readily with the oil, gravel packing will fill the cavity formed by the disintegrating sand and prevent further slumping and caving of the oil formation. Some sands have particles so exceedingly fine and flowing pressures so high that the sand tends to get through even the finest screens, enlarges openings, and reduces the life and usefulness of the screen in a few months. Since the passageways through fine gravel are never in a straight line, the winding channels are soon clogged with the coarse grains of sand and the flow of fine sand stopped.

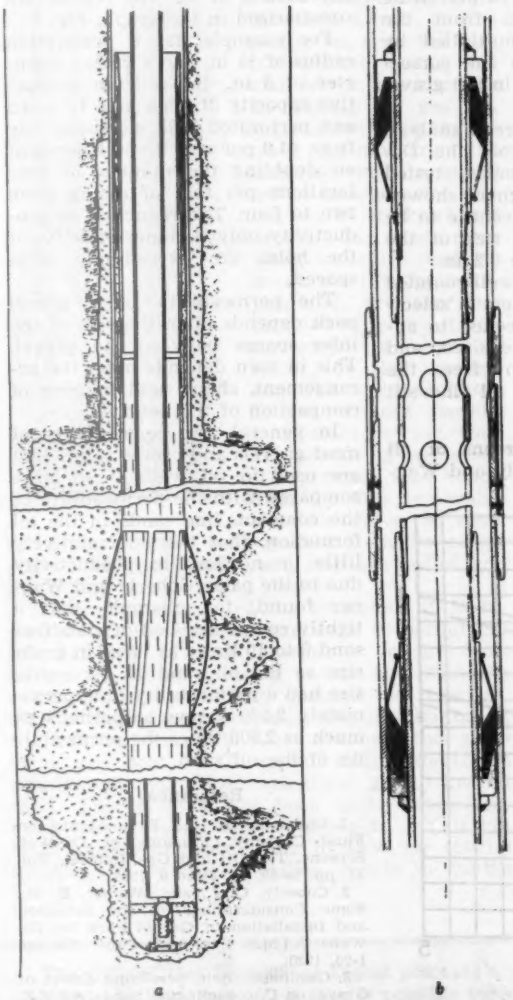

Fig. 1: Diagram of a gravel-packed well showing wash pipe, wash-line assembly for placing gravel, perforated pipe and packer. (After Coberly and Wagner)

In wells where sands are fine and permeability low, it is considered advantageous to enlarge the hole by underreaming and in this way increase the productivity of the well.* If the sand is quite friable or crumbly when this procedure is attempted, it will in many cases slump and fill up the space around the screen and thus reduce all advantages of a larger hole. If the enlarged space around the perforated pipe is filled with gravel before slumping takes place, this difficulty is overcome. These advantages also apply to water wells where large production of water is desired and where high rates of flow tend to cause much slumping of loose sands.

Disadvantages of the use of gravel are: A gravel pack cannot be so easily backwashed and thoroughly cleaned as an ordinary screen. Also, gravel in some cases becomes so tightly wedged in the space between the pipe and oil sand that it is quite difficult to pull and recondition the flow line. It is also more trouble to set than an ordinary screen, at least until one has had considerable experience in gravel packing.

Method of setting gravel pack.— The method of finishing a gravel-packed well as described by Coberly and Wagner[2] is illustrated in Fig. 1. The well is drilled in the usual way; the casing is set, cemented, and underreamed through the oil sand, if desired. The well is then swabbed or bailed and the liner set, containing the proper sized slots or mesh of screen to retain the gravel. In water wells, in most cases, the perforated pipe is set on the bottom of the hole. In the case of oil wells where slumping is bad, it is hung in the hole and centered by means of a packer-type hanger as shown in Fig. 1. In the case of water wells the calculated volume of gravel needed is poured down between the perforated water liner and casing until the annular space occupied by the water sand is completely filled. In the case of oil wells the liner is equipped with a special shoe and wash-pipe setting assembly (Fig. 1). The assembly consists of a left-hand thread for landing the wash pipe and a ball check valve through which the oil and wet gravel will flow into the annular space between the liner and sand, but which will prevent any gravel coming back into the wash pipe.

*See article on increasing production by enlarging hole. Engineering Fundamentals No. 168, The Oil and Gas Journal, January 13, 1945.

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

Engineering Fundamentals (Continued)

The gravel-oil mixture is pumped into the wash pipe when the reservoir pressure is high or poured in when the pressure is low. The pouring or pumping is continued until the annular space is filled. This stage is indicated by excessive pumping pressure in the case of pumping or by the tubing filling up if the gravel mixture is poured in. The tubing is then unscrewed and removed, the well is bailed clean of excess gravel, and put on production. It is, of course, most important that the annular space be completely filled with gravel; if not, the well will produce sand. For this reason, if possible, it is important to provide space for an extra volume of sand in back of or above the wash-pipe setting assembly to take care of any volume of gravel lost due to settling or compaction of the gravel after placing in the hole.

Selecting correct size of gravel.—Sage and Lacey,[4] Coberly and Wagner[2] and Gumpertz[3] have investigated the design of gravel screens and the size of gravel particles which are most effective. Coberly and Wagner concluded that where the gravel is set in a hexagonal system of packing, and this condition occurs in the majority of cases where the gravel is carefully placed in the well, the proper size of particle should be about 10 to 12 times the size of the largest 10 per cent of the oil-sand grains. The 10 percentile is determined from a Tyler screen analysis as follows: The accumulative weights of the several portions of the screened sand are plotted on semilog paper against the grain-diameter size determined by the screening. The diameter of gravel grains in most cases is taken as the width of the opening through which the grains pass. The diameter of sand grains on the other hand is taken as the width of the opening in the screen on which the grains are retained. Then the size of the 10 percentile accumulated is read from the graph. This figure multiplied by 10 or 12 is taken as the correct size of pebbles to use in the gravel pack.

For example, the screen analysis of a core sample from the Dominquez field, California, tested by Coberly and Wagner, showed the size of the 10 percentile to be about 0.02 in. The size of the gravel then would be 0.2 in.

Gravel containing well-rounded grains of quartz or chert is selected in most cases, screened to approximately the size desired, and carefully washed to free the screened gravel from all fine silt and dust.

Permeability of screens of oil wells.—Muskat, Coberly and Wagner,[2] Sage and Lacey,[4] and Gumpertz[3] have investigated the effect of screens on the productivity of oil wells. The flow capacity of a perforated pipe depends upon the size and number of perforations for a given viscosity of oil and pressure.

Muskat found that variations in ratio of the productivity of an open hole to that of a perforated, cased hole with different numbers of perforations per foot of casing were not so large a factor as might be expected, particularly when the number of perforations per foot exceeded 5 or 10. His results are summarized in the graph, Fig. 2.

For example, for a perforation radius of ¼ in. and a casing diameter of 6 in., the relative productive capacity of open hole to cased and perforated hole increases only from 41.9 per cent to 59.4 per cent on doubling the number of perforations per foot of casing from two to four. The reduction in productivity only becomes effective if the holes are exceedingly wide spaced.

The permeability of a gravel pack depends upon the size of the inter spaces between the gravel. This in turn depends upon the arrangement, shape, and amount of compaction of the pebbles.

In general, the permeability of most gravels and coarse sands that are used in oil wells is so large compared with the permeability of the compact, fine sands in the oil formation, that there is relatively little or no loss in productivity due to the pack. Coberly and Wagner found, for example, that a tightly compacted bed of classified sand 8 to 10 times as large in grain size as the oil sand 10 percentile size had a permeability of approximately 2,500 darcys or perhaps as much as 2,500 times the permeability of the oil sand.

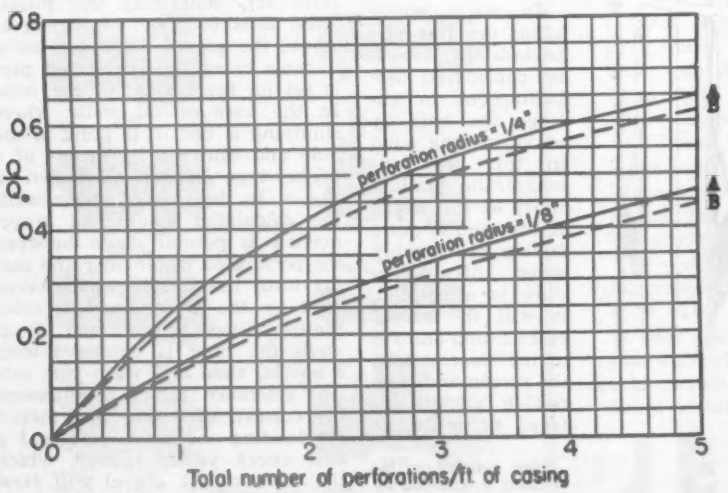

Fig. 2: Graph effect of number of perforations and size of perforated pipe on productivity of an oil well; A, 6-in. pipe; B, 12-in. pipe; Q = capacity of cased well; Q_o = production capacity of uncased well. (After Muskat)

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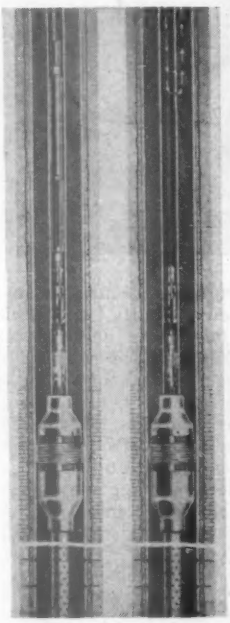
1. Chenault, R. L., Experiments on Fluid Capacity, Plugging of Oil-Well Screens, The Oil and Gas Journal, Vol. 37, pp. 54-62, 65, June 9, 1938.
2. Coberly, C. J., and Wagner, E. M., Some Considerations in the Selection and Installation of Gravel Pack for Oil Wells, A.I.M.E. Pet. Tech. Paper 960, pp. 1-20, 1930.
3. Gumpertz, Ben, Screening Effect of Gravel on Unconsolidated Sands, A.I.M.E. Pet. Tech. Paper 1195, pp. 1-8, May 1940.
4. Sage, B. H., and Lacey, W. N., Effectiveness of Gravel Screens, A.I.M.E. Pet. Tech. Paper 1325, pp. 1-18, May 1941.

OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

by Kenneth E. Barnes

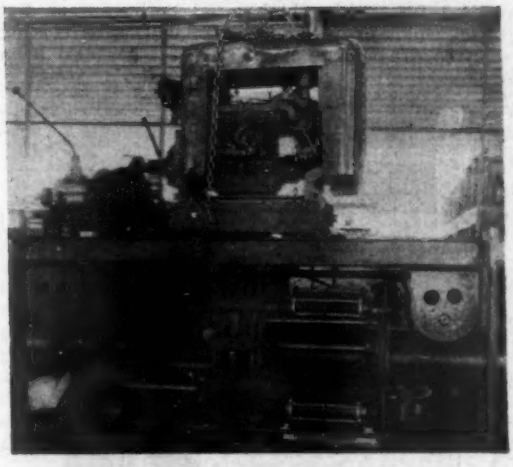
(1) TUBING PERFORATING SERVICE utilizes the new Otis Type L perforator on a wire line (left). In conjunction with a removable tubing stop and check valve, a means is provided to wash mud from the casing annulus in certain jobs. For example, some wells originally have been completed, as in the Gulf Coast, with a packer set near the bottom of the casing and mud left in the annulus. In placing on gas lift, first operation is to remove the mud from the annulus, then to install orifice inserts in the tubing walls at desired depths. In most cases when wells are ready to go on gas lift, their bottom-hole pressure has dropped to where it will not support a column of water, or the pressure required to break circulation, without permitting fluid to penetrate the producing formation. To prevent this condition the Otis removable check valve is used.



After the mud has been washed from the casing (right), the check valve and stop are pulled and the tubing perforated as desired.

Most common use of the perforator is to install orifice inserts in tubing walls to permit gas lift. Majority of such operations are in wells having no tubing-to-casing packer and with the casing annulus clean and open to the reservoir. This condition requires only the installation of the inserts, taking 3 to 4 hours' time. Other principal uses are: (1) To install orifice inserts in tubing walls to utilize casinghead gas to kickoff well. This practice has been quite extensively used, and although not a permanent lift, it has been known to cause wells to flow for several months; (2) to install orifice inserts in tubing walls to utilize gas from an upper zone or gas cap that has been packed off; (3) to perforate tubing above a packer to establish circulation to kill the well; (4) to perforate tubing to wash out bridge in casing; and (5) to perforate tubing to acidize upper zone of two-zone wells not equipped with side-door chokes. *Otis Pressure Control, Inc.*

IT'S NEW ✓ CHECK IT



(2) PIPE-CLEANING MACHINE, newly developed, operates with a combination of rotary brushes revolving at 1,200 r.p.m. and hammers at 400 r.p.m. The three hammer units and the three brushes also rotate planetarily about the pipe at 50 r.p.m. in a direction counter to that of their individual rotations.

The machine is driven by a Red Seal Continental industrial engine developing 40 hp. at 1,400 r.p.m. The usual type of priming head is fitted to the rearmost member of the frame and is synchronized with the crawler transmission system.

The first model was completed on March 1, 1945, for sizes from 12-in. to 24-in. o.d. A machine for sizes below 12-in. is now being designed. A few days after completion, the effective perform-

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

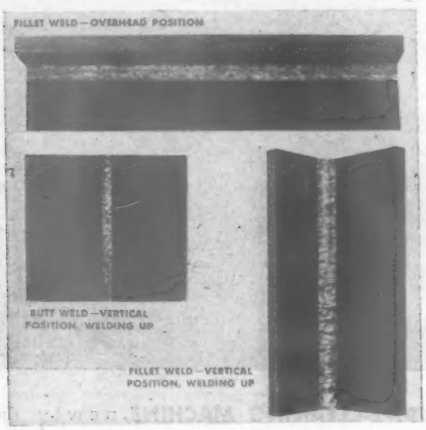
Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

ance of the design was demonstrated before a group of pipe-line engineers. *Perrault Bros. Supply Division.*

IT'S NEW CHECK IT

(3) ALL-POSITION WELDING ELECTRODE of shielded-arc type is announced for general-purpose welding. The new electrode, designated as "Fleetweld 47," offers such advantages as extremely low spatter loss, easy slag removal (most welds are practically self-cleaning), excellent restriking characteristics, and other improved features.

"Fleetweld 47" conforms to American Welding Society electrode specifications Class E-6012 and E-6013 and may be used with either alternating or direct current. "Fleetweld 47" is especially well suited for making high-speed horizontal or flat fillet welds over 4 in. long in which the coating can be dragged on both plates. It has also been



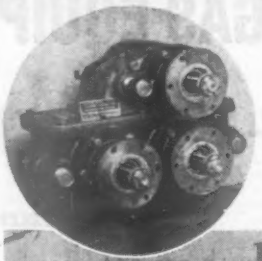
used extensively for both vertical and overhead fillets, especially where large single-pass fillets are desired. Complete penetration of ¼-in. plate can be obtained by welding one pass from each side. This latest addition to Lincoln electrodes has undergone extensive field tests with excellent results. Illustrated are specimen welds produced with the new electrode. *The Lincoln Electric Co.*

IT'S NEW CHECK IT

(4) PLASTEEL PROTECTIVE COATING is a corrosion-resisting material for application to pipe by means of spray, brush or dipping. According to the manufacturer, the plastic product is tough and flexible, having an adhesive strength of 3,980 psi. A number of accelerated tests equivalent to 14 years' underground service showed no effect on the coating. Dielectric strength is extremely high and on a recent test 7,500 volts were required to break through a Plasteel thickness of 0.0125 in. *Fraser Chemical Co.*

IT'S NEW CHECK IT

(5) SIX-WHEEL SWAMP BUGGY is equipped with a special Fabco dual drive. The truck pictured is one of many interesting units developed with Fabco drive mechanism for cross-country transportation of geophysical equipment. This particular job is a water truck used to haul water to core-drilling rigs which are mounted



on similar units. The importance of securing minimum wheelbase for maneuverability, and still have a split-shaft power takeoff to deliver full engine power to operate drill rigs, led to the development of Fabco power tower takeoffs. These are available in a number of ratios, and either "engine" or "opposite engine" rotation. The power takeoff mounts on top of the Fabco selective transfer case, which also includes a 2.34:1 under-drive ratio which proves most effective when maximum traction is required. Pictured in the insert is the Fabco dual-drive transfer case and top-mount power takeoff. *F. A. B. Mfg. Co.*

IT'S NEW CHECK IT

(6) HIGH LIFT POP VALVE is new development with exceptionally high coefficient of lift for the disk. This high lift is secured through unique design of the valve disk, by which the velocity of the fluid is entrapped and its kinetic force is converted into additional lift for higher relief discharge. The pop valve is built with an adjustable single blowdown ring which permits regulation of pressure to be relieved on individual operations. Economical, minimum blowdown results—without interruption to operations due to unnecessary loss of pressure from relief action. Long, accurately calibrated carbon-steel springs are used. Models are also available with a hand wheel for easy and accurate pop adjustments on jobs requiring frequent changes of operating pressures, or with packed adjusting bolt under a protecting cap for gas service. Another new Farris pop valve,

somewhat smaller, is built without an adjustable blowdown ring, this being replaced by a predetermined orifice. *Farris Engineering Co.*

IT'S NEW CHECK IT

(7) AERO-TITRATER WATER ANALYZER determines hardness, calcium, and magnesium in both industrial and potable water. Equipment uses a new end point, based on the foam-meter principle, reported to be unmistakable and reproducible with high precision. Instrument is simply operated, is supplied calibrated, has no delicate adjustments, is said to function satisfactorily in presence of substances which can interfere with usual methods of analysis. *Chief Chemical Corp.*

IT'S NEW CHECK IT

(8) MARKING GLASS AND METAL for identification, records, labeling, etc., may easily be done with the light-weight Vibro-Tool. The steel or tantalum carbide engraving needles make 120 reciprocal strokes per minute. Both narrow and wide-blade knife attachments also can be used for cutting of intricate patterns in small areas on some materials. *E. H. Sargent & Co.*

IT'S NEW CHECK IT

(9) RESINOUS COMPOUNDS for oil-well sealing have been developed especially for such applications by Wilmington Chemical Corp. in collaboration with Synvar Corp. The new product, known as Synvar oil-well sealing compound, provides a water and oil-resistant seal, and forms an integral and uniform structure with rock formation and pipe. A minimum of shrinkage is obtained, and the new compound can be used at any practical temperature.

The product is supplied in separate components which are combined just before use, with the proportions of the different components adjusted to suit existing well conditions. *Wilmington Chemical Corp.*

IT'S NEW CHECK IT

(10) ALL-ELECTRIC BLASTING CAPS, with nylon-insulated wires and rubber plug closures. The wire covering is of tough, abrasion-resistant nylon, and is the equal of enamel insulation in preventing current leakage. Not affected by extreme or rapid changes in temperatures. Furnished in brilliant colors, minimizing possibility of error in connections. The rubber plug closures, double crimped in the shells, replace the combination of bridge plugs. Resistance to water penetration is increased with asphaltic waterproofing and sulfur seal. The new shells are much shorter than the old type, without sacrificing explosive strength. *E. I. duPont de Nemours & Co.*

IT'S NEW CHECK IT

(11) DELAYED-ACTION OIL-WELL SHOOTING. A new procedure is being offered for shooting of oil wells at greater distances out from well bore. Patent rights on this process cover the delayed explosion of a gun projectile which is fired horizontally into the sand from well bore, and explodes after a predetermined delay. A relatively small projectile is thus driven back into the producing section before detonating with great power. Offered for the purpose of reshooting old stripper wells, or new wells where a tight sand condition prevails. *Well Explosives, Inc.*

IT'S NEW CHECK IT

TRADE LITERATURE

(12) STEEL GRATING. Catalog on open steel flooring and stair treads. Suggests ideas for improved design and construction. Shows how and where steel grating can be economically installed to provide necessary overheads, floors, platforms, pit coverings, stairs, etc. Also, charts are provided to calculate exact safe loads for open steel flooring. *Walter Bates Co.*

IT'S NEW CHECK IT

(13) DUPLICATE TRACINGS, made to exact scale and guaranteed accurate to within 0.1 per cent, is described in literature on the "Controlled Scale" process for producing exact duplicates, both on sensitized cloth and by the lithoprint process. Also, the process may be used to correct the incorrect scale or original tracings, or, when two tracings do not match, they may be reproduced as one, matching perfectly and to scale. *Rapid Blue Print Co.*

(14) ACID-PROOF CEMENT. Booklet is available on Penchlor acid-proof cement. Sets quickly (thus reducing construction delays). It is a self-hardening sodium silicate-type cement which has established long life service records under severe acid conditions. Used as a mortar, adheres strongly to brick, steel, glass, lead, rubber and asphalt. *Pennsylvania Salt Manufacturing Co.*

IT'S NEW ✓ CHECK IT

(15) WHAT'S GOING TO HAPPEN to the orders you place when the war ends? This is title of booklet available, which contains suggestions on how to avoid the confusion and difficulties resulting from a concerted effort to replenish depleted inventories. Written in a humorous yet informative fashion. *Dresser Manufacturing Division.*

IT'S NEW ✓ CHECK IT

(16) NEW VALVE CATALOG and MAINTENANCE MANUAL Supplementing all previous Merco Nordstrom Valve Co. literature, this new 134-page catalog presents the latest information on valve listings, specifications, engineering tables, lubricant data, etc. Well illustrated, with detailed drawings clearly depicting construction features. The maintenance manual is designed to give users the proper routine of lubricating plug valves; a convenient reference work on the subject. *Merco Nordstrom Valve Co.*

IT'S NEW ✓ CHECK IT

(17) WALL CHART OF WELDING SYMBOLS. An entirely new and informative wall chart, illustrating the basic characters of welding symbols recommended as American Standard by American Welding Society. Graphical language of the welding industry in chart form suitable for hanging on wall. *The Hobart Brothers Co.*

IT'S NEW ✓ CHECK IT

(18) RUST, CAUSES AND PREVENTION. An 80-page book on this subject covering the entire subject, with particular emphasis on prevention. Discussion and illustrations cover preventive materials, choice of preventives, and application of preventives. *E. F. Houghton & Co.*

IT'S NEW ✓ CHECK IT

(19) PROCESS EQUIPMENT. Bulletins are available on steam-tube rotary dryers, turbo-mixers and sludge filters. Well illustrated, with specifications, design and application data. *General American Process Equipment Division of General ican Transportation Corp.*

IT'S NEW ✓ CHECK IT

INDUSTRIAL ITEMS

Nuwell Tool Co., manufacturers of floating equipment, have moved into their new plant at 2438 Summer Street, Houston, Tex. **Charles S. Casley,** who for the past 4 years has been connected with the vocational department of the Houston schools, will be in charge of plant operations, according to **J. H. Grubb,** president of the company.

Johnston & Jennings Co., Cleveland, Ohio, announces the appointment of **Murray Russell,** formerly sales manager of the company's Oceco division, as manager of the office newly established in Washington, D. C. **C. J. Van Landeghem,** formerly sales manager of Philip Carey Manufacturing Co., Cincinnati, is new sales manager of the Oceco division.

The Gas Process division of The Girdler Corp., Louisville, Ky., has opened a New York office at 150 Broadway. It will be managed by **J. D. Gordon,** eastern representative of the firm.

William A. Elliott has been elected executive vice president of Elliott Co. He is also a member of the board of directors of Elliott Co.

Jessop Steel Co., Washington, Pa., has established Pittsburgh branch offices in the Bessemer Building. **William Z. Burns** is in charge.

John L. Young, former vice president in charge of industrial research and development of United Engineering & Foundry Co., Pittsburgh, Pa., has been elected vice president in charge of engineering of National Tube Co.

H. E. Cassidy has been elected board chairman of the Pacific Council of the American Association of Advertising Agencies. With Cassidy on the new board are: **Warren Kraft,** Erwin Wasey Co., Seattle; **C. L. Baum,** Short & Baum, Portland; **Robbins Milbank,** Young & Rubicam, San Francisco, and **Dana Jones,** Dana Jones Co., Los Angeles.

Dave Smith has accepted a position with Western Gear Works, Seattle, Wash.

Austin Jones, formerly research and development engineer of Kerotest Manufacturing Co., Pittsburgh, Pa., has been named Toledo district manager with headquarters at 1743 West Central Avenue, Toledo, Ohio. He will supervise sales in Ohio, Michigan, Eastern Indiana and Central Kentucky areas.

Bethlehem Supply Co. announces the opening of its Oklahoma district office, Suite 550, First National Bank Building, Oklahoma City, Okla. **W. T. Davis,** district manager, will direct the activities of the district.

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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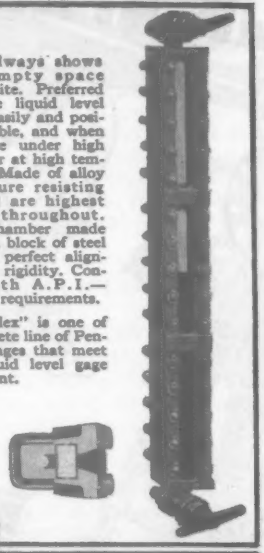

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REFINING

Government Seizes Plant And Strikers Go Back

LAKE CHARLES, La.—Following government seizure of Cities Service Co.'s high-octane refinery here, employes who left their jobs April 9 because of an announced increase in rent charges decided to go back to work. Six hundred returned voluntarily on April 19 and as many more voted to resume their jobs. Company officials said it would be 10 days before full production could be attained owing to necessity of reconditioning some of the machinery.

No labor issue was involved. The $75,000,000 refinery closed when workers quit and forcibly prevented others from working because of the dispute over rents at the nearby Maplewood housing project. The work stoppage affected more than 1,500 employes.

Workers said they had received notice their rents would be increased from $54 to $66 a month on the larger units and proportionately on smaller houses. Maplewood residents at a mass meeting voted to continue their efforts to obtain rent adjustments and to petition Federal Housing Administration to take over the Maplewood project.

Speaking for Petroleum Administrator for War, Ralph K. Davies, deputy administrator, said: "We have no opinions concerning the merits of the dispute. It is our job to see to it that the production of essential war petroleum products is maintained. This is our only interest in the case."

Specifications for Fuel Oil And Gasoline Changed

BISMARCK.—Changes in specifications for gasoline and No. 1 light fuel oil have gone into effect in North Dakota. Effective for 8 months, all gasoline sold in the state must show not less than 10 per cent evaporated at 167° F. Other requirements are unchanged.

Specifications on No. 1 light fuel oil in burners requiring a volatile fuel: Flash point shall not be lower than 115° F. and not higher than 165°. There shall not be more than a trace of water and sediment. Pour point shall not exceed 0° F. Distillation test: When 10 per cent has been recovered in the receiver, the thermometer shall not read more than 410; the end point shall not be higher than 560; with maximum end point increased to 590 when used in burners other than sleeve-type blue flame burners.

Important Export Business In Prospect, Says Henle

NEW YORK.—This country's oil industry has in prospect 3 to 5 years of important postwar export business in all grades of petroleum products, according to S. Henle, president of S. Henle, Inc. The demand will come first from Europe, South America, Africa and British India.

When hostilities in the Pacific cease, demand will come from Far Eastern countries, since it will be some time before the reconstruction program in the British as well as Dutch East Indies enables these countries to export petroleum products to their neighboring markets, says Henle, whose company recent-

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ly completed 37 years as an exporter of petroleum derivatives to all parts of the world.

"Refineries in France, Poland, Rumania and Czechslovakia are not yet ready to supply the European industry with any grade of lubricants. Russia, turning out lubricants of good quality, will have no surplus for export.

"Producing countries in the Near East are about to construct refineries which might supply at the outset only light oils such as kerosene, gasoline, gas oil and fuel oil and hardly any lubricants.

"Foreign railroad companies have to come to our market for substantial purchases. Truck and bus companies, as well as motor car operators, will turn to the United States for their requirements."

No Need for Worry About Gasoline, Says Wilson

KANSAS CITY.—It will be centuries before this country will have any reason for worry about a gasoline shortage, said Dr. Robert E. Wilson, chairman of Standard Oil Co. (Indiana), in a statement here.

"If the crude oil runs out, the industry is prepared to make just as much gasoline from other sources," Wilson said, adding that "the best sources for the far future lie in the minds of men who already have developed methods of making gasoline from natural gas, oil shale and coal."

He disclosed that a new superfuel for planes would go into production with the collapse of Germany.

"Plans already have been made to take the cream out of 100-octane gasoline now used in military planes and make superfuel for American planes," he asserted. "The less valuable constituents left over will go into motor gasoline and thus moderately increase the quality and quantity."

Government Lets Contract For Oil-Shale Laboratory

WASHINGTON. — A contract for construction of an oil-shale research and development laboratory of the Bureau of Mines at University of Wyoming, in Laramie, has been awarded to E. C. Nickle, Arcadia, Calif., whose bid was $534,000. The laboratory is to be an integral part of the national synthetic liquid-fuels demonstration program to enable the United States to get gasoline and other liquid fuels from coal and shale when and if necessary. The building must be completed by December 31, 1945.

The plans, drawn by Frederic H. Porter, architect, of Cheyenne, Wyo., call for a fireproof building of reinforced concrete faced with native stone, which will conform to the architectural motif employed in other campus buildings. Dimensions of the main section, three stories high with four floor levels, will be 192 by 59 ft. The wings will measure 60 by 44 ft. with that on the south having two stories. Facilities will be provided for laboratory and small pilot plant experimental studies on processes for refining shale oil, retort testing and development, and other research. Provision also will be made for offices, a library, machine shop, drafting and blue-printing, and other needs of the 70 additional technical and administrative employees to be stationed at Laramie. The ground was donated by the university.

The laboratory will be operated in conjunction with a $1,500,000 oil-shale demonstration plant to be established on United States naval oil-shale reserves in western Colorado. A site has been chosen in the Anvil Points area, about 7 miles west of Rifle. This plant will serve as a proving ground for processes to convert the nation's large reserves of oil shale into fuels and lubricants.

Main functions of the new research and development laboratory will be the determination of fundamental chemical, physical, thermodynamic, and other engineering facts.

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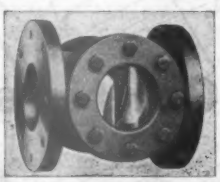
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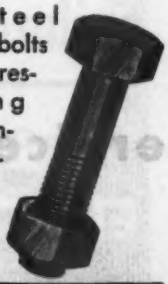
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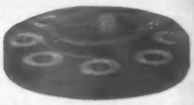

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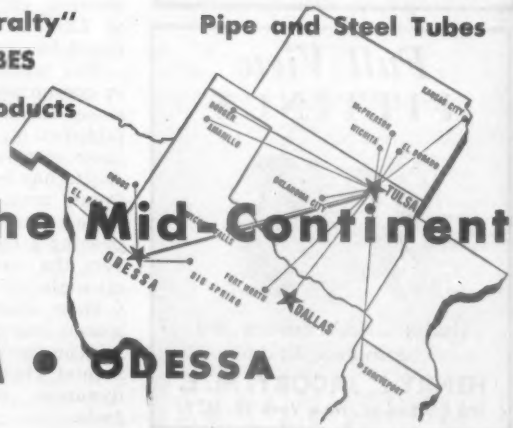

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Natural Gas

Columbian Carbon Plans to Build Hugoton Field Plant

TOPEKA.—Columbian Carbon Co. has filed with the Kansas Corporation Commission an application for permission to construct a carbon-black plant 5 miles southeast of Hickok, in Grant County. The proposed plant would consume approximately 15,000,000 cu. ft. of gas daily from the Hugoton field. Wells would be drilled as the plant was being constructed. Price of 4 cents a thousand cubic feet would be paid for the gas.

Gas Reserves at Top, Kelly Tells Measurement School

NORMAN, Okla. — "Proven natural-gas reserves in the United States are at the highest level in history, estimated in excess of 100 trillion cubic feet," F. S. Kelly, Jr., president of Southern Gas Association and of Arkansas Louisiana Gas Co., told more than 600 natural-gas operators attending the annual 3-day Southwest Gas Measurement Short Course at University of Oklahoma.

Classes were conducted April 17-19 on various subjects related to natural-gas measurement and other phases of the industry. W. H. Carson, dean of engineering at the university and one of the originators of the short course 20 years ago, was in general charge.

Kelly, whose talk was one of the features of the sessions, said: "Ten years ago these reserves were estimated at 60 trillion cubic feet. Two years ago they were approximately 85 trillion, and 1 year ago they were approximately 95 trillion. At the meeting of the natural gas department 1 year ago the proven and ultimate potential reserves in the United States were estimated at around 300 trillion. The proven reserves today, when considered in light of recent discoveries, such as the Carthage field in East Texas with an estimated 8 trillion cubic feet are, in my opinion, in excess of 100 trillion.

"The theory of holding our mineral resources for posterity is fine, assuming that inventions, discoveries and technological developments are frozen, and that we will cease to make further progress.

"We all know this is not true, that the postwar period will see unprecedented expansion in all lines. I feel that the reasonable and necessary long-distance pipe lines are beneficial, because these lines are bringing and will bring, substantial wealth to the South and Southwest in the form of lease bonuses, right-of-way payments, exploratory and drilling operations, and every operation connected with or incidental to the gas and oil business."

Louisana Denied Rehearing In Gas Export Litigation

NEW ORLEANS. — United States Fifth Circuit Court of Appeals has refused to grant a rehearing on its recent decision upholding the right of Memphis Natural Gas Co. to construct additional pipe lines for increasing its flow of gas from Louisiana fields to Memphis.

Rehearing was asked by the state of Louisiana on technical points and the state's claim that diversion of additional gas would work against conservation measures. The state has announced that it will carry its case to the United States Supreme Court.

Drilling for Gas in Texas Shows Sharp Increase

AUSTIN.—Through March 17 this year 112 new gas wells had been reported in Texas, in contrast with 48 in the corresponding period of 1944. Seventeen of these wells were classified as discoveries, an increase of 10 over the figures for last year. In the same period 801 new oil wells were reported compared with 614, including 28 successful wildcats against 35 last year. Failures totaled 386, compared with 145 last year.

Texas House Passes Bill Reenacting Gas Tax Rate

AUSTIN. — The Texas House of Representatives passed without debate, 114 to 1, a measure reenacting the state's gas tax rate and strengthening provisions for collecting it. The bill clarifies the present enforcement act in several respects, especially with respect to the collection of natural-gas taxes upon the liquids extracted from gas.

The tax rate is 5.2 per cent of market value at the well, and the bill provides this levy shall be made upon a basis of three-fifths of the gross value of all liquids extracted. It provides further that the comptroller may fix the market value of gas at the well, after notice and hearing, if he is dissatisfied with the values which have been used in computing the tax.

Peoples Natural Acquires Franchise in Johnstown

JOHNSTOWN, Pa.—Peoples Natural Gas Co., of Pittsburgh, has completed negotiations for purchase from Pennsylvania Electric Co. of the local utility, which distributes natural gas to 18,000 consumers in the Johnstown area. Penelec disposed of its franchise, gas mains, and other facilities for a consideration approximating $1,200,000, according to President Philip H. Harris. The transfer becomes effective June 30. Colin U. Miller will be retained by Peoples as superintendent, a post he filled in Penelec's gas department.

Penelec has furnished natural gas, purchased from Peoples and piped from wells in western Pennsylvania and West Virginia, to consumers in Johnstown, Dale, Westmont, Southmont, Lorain and Ferndale.

Peoples has been supplying the gas requirements of Penelec and its predecessors since 1907. Penelec was in the gas distribution business until last December 1, through a subsidiary, Johnstown Fuel Supply Co. On that date a merger of the two companies was completed and machinery soon was in motion that led to Penelec's leaving the gas-dispensing field.

Rise Recorded in Louisiana Natural-Gas Production

BATON ROUGE.—Louisiana natural-gas production in 1944 totaled 799,521,705,000 cu. ft., compared with 699,413,415,000 in 1943, Joseph L. McHugh, state conservation commissioner, announces.

Natural Gasoline

Hercules Natural-Gasoline Plant Purchased by Gulf

HOUSTON.—The casinghead gasoline plant of Hercules Gasoline Co. at Kilgore has been purchased by Gulf Oil Corp. The consideration was not made public. More than 2,500 wells in the East Texas field are connected to the Hercules plant.

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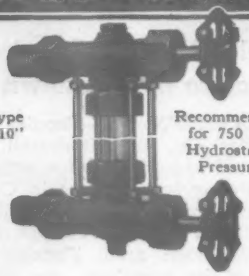

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PIPE LINES

Large Compressor Units Built for Cities Service

The largest gas pipe-line installation of angle gas compressors ever assembled under one roof was recently completed by Cooper-Bessemer Corp. for the Cities Service Transportation and Chemical Co. at Guymon, Okla.

The distribution system is capable of pumping 270,000,000 cu. ft. of gas per day. The installation consists of 15 GMV, 10-cylinder Cooper-Bessemer units, each rated at 1,000 b.hp. at 300 r.p.m. at sea level. Each unit is equipped with three 8-in. by 14-in. double-acting, liner type, cast compressor cylinders with a capacity of 18,000,000 cu. ft. per day.

The compressor plant pumps natural gas from the Hugoton field to Blackwell, Okla.

The 15 compressors give the plant 15,000 b.hp. under one roof. The gas comes to the station at 300 psig. suction pressure and is compressed to 720 psig. discharge pressure. From the station the gas is piped through 230 miles of 26-in. solid welded line to Blackwell where it is connected into the Cities Service system.

Pipe Deliveries Expected Soon on Mississippi Line

First deliveries of pipe for Interstate Oil Pipe Line Co.'s 120-mile system of 8, 10 and 12-in. line from Mississippi fields to Baton Rouge, La., are expected along the right-of-way within the next week. Construction contract will be awarded shortly.

Design for the Gibson Landing, Cranfield and Liberty stations are progressing and nearly 70 per cent of the right-of-way has been purchased.

Scope of Utah's Rangely Line Project Expanded

WASHINGTON.—Important additions to the Utah Oil Refining Co.'s Rangely pipe-line project have been approved by War Production Board. Besides the 152-mile 10-in. crude line from the Rangely pool in Colorado to Wamsutter, Wyo., a two-wire, 104-mile telephone line will be constructed from Rangely to Baggs, where connection will be made with the existing communication system from Iles Dome, Colo., to Wamsutter. The revised project also includes a gathering system in Rangely field consisting of 27 miles of 2 to 12-in. pine lines, a pump station housing two 400-hp. gas or convertible diesel-driven reciprocating pumps, and other miscellaneous buildings. Two 22,600-bbl. oil tanks will be erected at the station.

Extensions will be made to present stations at Wamsutter and Granger and additional pumping equipment installed. A 25-mile 8-in. loop, paralleling the present 6-in. line, will be laid between Uintah Junction and the Utah Oil refinery at Salt Lake City, by way of the Wasatch Oil Refining Co.'s Wood Cross plant.

The new facilities will provide a through pipe-line route from Colorado to Salt Lake City. When production exceeds capacity of the Salt Lake City refineries, oil will move eastward to Fort Laramie, Wyo., and thence to other refineries in Districts 2 and 4. Work is expected to start in May and the entire project should be completed in September.

Humble to Build Outlet for Andrews County Pool

FORT WORTH.—Humble Pipe Line Co. is to build 4 miles of 4-in. line from its Fuhrman-Mascho pool in Andrews County to the pool recently opened in the southern part of that county by Sun Oil Co. 1 Martin, thus affording an outlet for the area opened by the Sun discovery.

Catenary Canyon Crossings Used on New Gas Line

The Southern California Gas Co. and the Southern Counties Gas Co. officially announced last week completion of the new 100-mile natural gas pipe line from the Goleta gas field in Santa Barbara County to Los Angeles. Cost of the new line was approximately $4,100,000.

Long self-supporting catenary pipe spans were used in the mountainous sections of the pipe line. These spans, which crossed canyons varying in width from 180 to 420 ft., represent a new departure in construction.

Owners and builders of pipe lines

have expressed considerable interest in the spans, which have no cable suspension or other external supports. The buried pipe line approaching the banks of the canyons provides the only anchors. The pipe sags across canyons and assumes the approximate shape of a curve as applied to suspension bridges.

Impounded Funds of Pipe Line to Be Distributed

KANSAS CITY.—Methods to be followed in distributing $19,500,000 in impounded funds to customers of Panhandle Eastern Pipe Line Co. were discussed here last week by judges of the Eighth United States Circuit Court of Appeals and a score of lawyers. The money, in Kansas City banks, has been impounded since September 1942 when Federal Power Commission ordered Panhandle Eastern to reduce rates on its gas delivery over an area extending from the Texas Panhandle to Michigan.

The United States Supreme Court April 2 upheld the original FPC order. The company, under its appeal, continued collection of the gas rates existing before the FPC order and the courts directed it to impound each year funds equal to the difference between the rates ordered by the commission and those charged.

Liquefied Gas Line Placed in Operation

HOUSTON.—Deliveries of liquefied petroleum gases through a 4-in. line from the Katy cycling plant in Waller County, Texas, to Freeport, Tex., were started this week. The 60-mile line is constructed of pipe designed to withstand 2,000 psi. pressure. Operating pressure on the line is 1,000 psi. at which the mixture of gases is retained in its liquefied state for transmission to the magnesium plant of Dow Chemical Co. at Freeport.

Welding Completed on One Branch of Wyoming Line

All pipe has been welded on Sinclair Refining Co.'s 23-mile 8-in. crude-oil line from Crook's Gap to Lost Soldier, Wyo. Five miles of the line have been laid in ditch and backfilled. The remaining 18 miles of line will be left on the surface temporarily.

All pipe for the company's 36.5-mile 8-in. segment from the Big Sand Draw field to Crook's Gap has been received. About 20 miles of pipe have been strung and 8 miles welded by the O. C. Whitaker Co., which has the construction contract.

Tankage is completed at Crook's Gap and the pumping station equipment is about 90 per cent installed. Tankage at Big Sand Draw is 40 per cent erected and station equipment is 80 per cent installed.

Emergency Lines Sustain Eastern Delivery Rates

WASHINGTON. — Pumpings through the 24-in. War Emergency Pipelines, Inc., crude-oil line from Longview to Norris City during the week ended April 13 average 318,057 bbl. daily. No deliveries were made to the Ohio line. Deliveries to the East Coast for the same week averaged 315,124 bbl. daily with 176,732 bbl. going to refineries in the Philadelphia area and 143,637 bbl. to the New York district.

Pumpings through the 20-in. WEP products line from Beaumont to Linden, N. J., averaged 233,365 bbl. daily. Deliveries from the East Coast terminal to purchasers in the New York area averaged 234,033 bbl. daily.

The Southwest Emergency line pumped from Heard station an average of 77,976 bl. daily of crude during the week ended April 11, according to the Petroleum Administration for War.

Contracts Canceled on 30 Government Tankers

WASHINGTON. — Contracts for construction of 30 tankers were canceled last week by the Maritime Commission, leaving 94 vessels yet to be built for the agency.

The commission's action was taken at the direction of the Office of War Mobilization and Reconversion, canceling a part of the program awarded in January.

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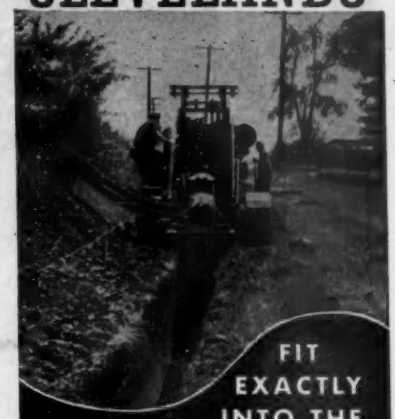

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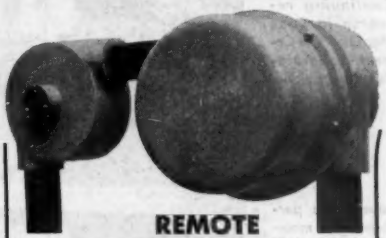

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SUCCESS of the entire oil-well investment depends upon a few hundred bags of cement. That's why we go all out to assure outstanding performance . . . performance proved behind thousands of miles of pipe: In deep wells, 'STARCOR'* for strong, dense, permanent shut-offs and high sulphate resistance. In deepest wells, 'TEXCOR'* with extra long thickening time and high sulphate resistance. In moderate-depth wells, 'INCOR'* for earlier drill-out. And LONE STAR CEMENT for dependable all-around service. Four great performers . . . use the cement that fits your well. *Reg. U. S. Pat. Off.

RESULT: OUTSTANDING PERFORMANCE, TODAY AND TOMORROW

LONE STAR CEMENT CORPORATION • DALLAS • HOUSTON

Exploration and Drilling

Week's Highlights

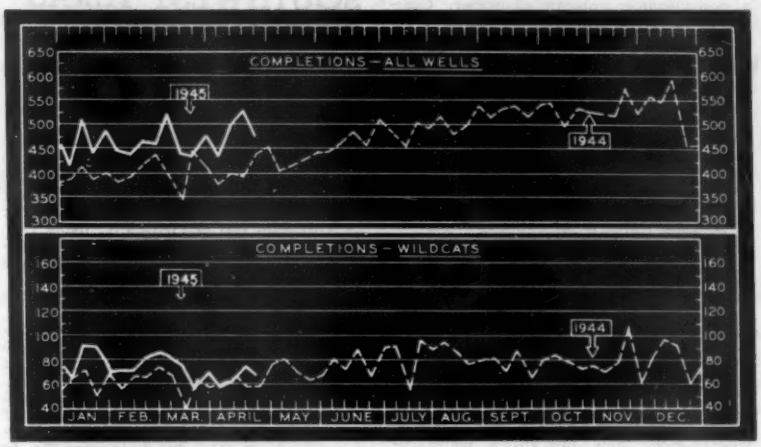
AN oil discovery in the Marjorie gas field, Barber County, Kansas, is attracting attention among those geologists who are seeking another trend of fields parallel to and south of the Central Kansas uplift.

The discovery well is J. M. Huber Corp. 1 Clay, NE SE SW 28-30s-13w, which flowed 164 bbl. of 38-gravity oil in 10 hours from perforations at 4,605-09 ft., from either the Maquoketa or the Viola. The important thing is that the oil-producing formation is pre-Mississippian. It gives more evidence of the presence of a large pre-Mississippian high in this general area with resultant thinning of that part of the section.

Some geologists believe that one or more pre-Mississippian regional highs should exist parallel to and south of the Central Kansas uplift. On the north side of the uplift, in pre-Mississippian time, there was a deep basin with thick sedimentary deposits. Testing in this area has been discouraging. On the south side, however, the slope into the basin is gradual and the pre-Mississippian sediments were deposited in much thinner sections in a series of gradual overlaps.

These geologists argue that the forces that caused anything as big as the Central Kansas uplift must also have resulted in one or more smaller parallel folds, and that other pre-Mississippian uplifts should exist along which oil may be found. Pennsylvanian folding, on the other hand, should be at right angles to the uplift, and along such trends, prospects for Pennsylvanian production should be good. Obviously where a line of Pennsylvanian folding intersects a pre-Mississippian line, there should be chances of finding a very large local structure and possibly big production.

There are numerous geologists who feel that somewhere in the area of the present Barber County play a line of Pennsylvanian folding intersects a line of pre-Mississippian folding parallel to the Central Kansas uplift and that there is a good change of finding something big in this area. Such a find would then give added encouragement to a play northwest in an attempt to find pre-Mississippian oil fields.



Solid line charts current weekly completions, service wells in Eastern area included

COMPLETIONS IN ALL FIELDS . . .

Week ended April 21, 1945

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1945	1944
New York	14	0	*14	28	36,412	353	286
Pennsylvania	36	5	†35	76	112,659	1,078	572
West Virginia	1	5	4	10	24,960	221	143
Ohio	3	6	10	19	51,437	230	280
Indiana	0	0	1	1	2,813	47	87
Kentucky	3	0	2	5	8,948	103	189
Illinois	10	0	5	15	41,492	458	480
Michigan	3	1	6	10	22,115	214	156
Kansas	14	3	17	34	112,115	463	526
Nebraska, Missouri, Iowa	0	0	0	0	0	12	12
Oklahoma	26	2	16	44	185,421	701	456
Texas:	68	17	31	116	564,496	2,138	1,474
North Central	18	2	11	31	74,907	604	420
West	18	1	2	21	111,468	558	448
Panhandle	2	5	1	8	25,840	177	45
Eastern	0	0	3	3	17,790	90	97
Gulf Coast	19	9	8	36	260,577	506	230
Southwest	11	0	6	17	73,914	203	234
Louisiana:	9	2	13	24	139,720	289	205
Northern	1	2	7	10	23,371	93	80
Southern	8	0	6	14	116,349	196	125
Arkansas	4	0	3	7	37,743	46	64
Mississippi	6	0	6	12	76,173	101	33
Southeastern States	0	0	1	1	4,066	10	10
Montana	3	2	0	5	12,512	80	68
Wyoming	2	0	1	3	17,270	64	44
Colorado-Utah	0	0	0	0	0	11	10
New Mexico	6	0	0	6	21,409	152	118
California	46	0	8	54	143,989	703	573
Total United States	254	43	173	470	1,715,750	7,474	5,766
Total previous week	272	60	197	529			
Total April 22, 1944	238	58	107	403			

Service wells included: *14, †32.

ILLINOIS

Jefferson County Wells Feature Dull Week

CENTRALIA.—Superior Oil Co. 1 Mary Fannon, NW NW SW 19-1s-2e, in the Boyd pool, Jefferson County, was the largest completion reported during the past week in Illinois, but it also made a considerable volume of water. Completed at 2,148 ft., and producing from Benoist and Aux Vases sands at 2,053-80 ft. and 2,123-46 ft., and shot with 20 qt., it produced 648 bbl. of oil and 162 bbl. of water in 24 hours. The shot was at 2,123-48 ft. and perforations were made at 2,053-61 ft.

Gulf Refining Co. 1 Green, SW SW SW 23-1s-3e, in the West Divide pool, Jefferson County, mentioned last week, continued to show large production in tests of McClosky lime. It showed 594 bbl. of oil and no water in 13 hours from a section of the McClosky at 2,732-42 ft.

The Texas Co. Devonian lime test in the Woodlawn pool in Jefferson County, 1 E. E. Eubanks, SW SW SE 35-2s-1e, topped the Devonian at 3,660 ft., total depth 3,721 ft. A drill-stem test showed 120 ft. of clean oil, 340 ft. of mud-cut oil and no water. The well is about in the center of the pool in which there are no wells producing from Devonian lime.

Only 10 oil wells were completed during the week, along with 5 dry holes. Twenty-eight new operations were reported including the following dry holes: Pekin Oil Project 1 DeSutter, NE SE NW 8-23n-6w, Tazewell County; H. R. Randall et al 1 C. C. Cyther, NW NE SW 13-5s-2e, Franklin County; Paul Doran 1 Brissenden, SE SE SW 16-3n-7e, Clay County; Robinson & Puckett 1 W. F. Moit, NE NW NW 33-1n-8e, Wayne County; W. H. Krohn 1 Haarman, SW SW SW 25-8n-5e, Effingham County.

ILLINOIS WILDCAT FAILURES

Edgar County: Sam J. Burkett 1 Ray Pennell, SW NW NE 12-12n-14w, dry at 1,307 ft. Casey sand at 405 ft. had a showing of oil.

Jefferson County: Magnolia 1 P. Wetzel, NE NW SE 22-1s-1e, dry at 2,440 ft. Tar Springs 1,709 ft., Cypress 1,941 ft., Benoist 2,112 ft., Benoist sand 2,118 ft., Aux Vases 2,198 ft., Ste. Genevieve 2,292 ft., Fredonia 2,336 ft.

White County: T. B. Dirickson 1 Grant, NE SW SW 36-6s-9e, dry at 3,104 ft., Benoist 2,815 ft., Renault 2,913 ft., Aux Vases 2,927 ft., Lower Levias (O'Hara) 2,962 ft.

SOUTHWEST TEXAS

Imogene Field Extended One Mile Northeast

CORPUS CHRISTI.—Humble Oil & Refining Co. 1 Joseph Courand, 1-mile northeast extension of Imogene field in Atasco County, recovered 240 ft. of oil, 90 ft. oily mud, and 150 ft. of salt water on drill-stem test at 7,661-69 ft., using 1-in. top and ¼-in. bottom chokes, in 40 minutes. Total depth is 7,669 ft. Operators are now preparing to pump.

Hewit & Dougherty 1 T. W. Wolfe, Bee County wildcat, 10 miles west of Pettus, in T. B. Barton Survey, on 9-minute drill-stem test at 6,749-55 ft. had gas blow, 495 lb. working pressure, recovered 15 ft. of brown condensate and 75 ft. of salt water. Cut another 5-ft. core at 6,755-60 ft. and made drill-stem test, recovered 150 ft. of salt water and 150 ft. drilling mud. Now drilling ahead. Magnolia Petroleum Co. 55 Duval Ranch Co., Gormac field, Duval County, in J. Poitevent Survey 209, on 24-hour potential test flowed 95.94 bbl. through ¼-in. choke, no water, tubing pressure 710 lb., casing pressure 840 lb., gravity 23.8°, gas-oil ratio 15,000, from open hole at 2,438-48 ft. Total depth is 2,448 ft with 5½-in. casing at 2,438 ft.

Hiawatha Oil & Gas Co. 8 George Herberger, East Longhorn field in Duval County, Section 26, Ball Ranch subdivision, recovered 230 ft. of free oil and 20 ft. of oil-cut mud, no water, on 13-minute drill-stem test at 5,151-54 ft. Total depth is 5,218 ft. Seven-inch casing was set at 5,192 ft., and operators now are waiting on cement to set.

Butcher-Arthur, Inc. and Taylor Refining Co. 1 G. Dudley, Fitzsimmons et al, Robinson field, Duval County, in Survey 295, on 24-hour potential test flowed 60 bbl. oil through 7/64-in. choke, tubing pressure 450 lb., no water, gravity 33.8°, gas-oil ratio 308 from 40 perforations at 4,023-33 ft. Total depth 4,727 ft., with 5½-in. casing at 4,100 ft.

American Republics Corp. 1 The Duval Co., Duval County wildcat, 15 miles northwest of San Diego in J. Poitevent Survey 550, was dry at total depth of 2,502 ft.

SOUTHWEST TEXAS SUCCESSFUL WILDCAT

Zapata County: McDermott oil discovery—Humble 1 Juana Y. McDermott, Sernardo Gutierrez Porcion 14, 25 mi. N Roma, TD 7,004 ft., perf. 2,609-18 ft., PT 5.5 bbl. oil daily through ½-in. choke, casing pressure 140 lb., tubing pressure zero.

SOUTHWEST TEXAS WILDCAT FAILURES

Atascosa County: J. W. Gorman and McDermott 1 U. A. Domsch, in J. T. Russell Sur. 1222, 4 mi. N Poteet, dry at 3,940 ft.

Brooks County: Humble 1 B. A. Skipper, Jr., "La Encantada Gr." Rachal Block, Tract 1, 1 mi. NW Rachall, dry at 6,288 ft.

Hidalgo County: Hamman Oil & Gas 2 John and George Hamman, San Salvador Del Tule Grant, 2 mi. NE Monte Christo, dry at 8,155 ft.

Jim Wells County: H. J. Porter 1 Gertrude Rehmet Hoffines, Wm. Parks Sur., Abs. 342, 2 mi. SW Orange Grove, dry at 5,430 ft.

Karnes County: Chas. Harris 1 Hilmer Monson, P. B. Butler Subd., 8 mi. SW Kenedy, dry at 55 ft.

Starr County: George H. Echols 1 M. M. Garcia, Porcion 91, Share 7-B Block 17, 14 mi. NE Rio Grande City, dry at 4,448 ft.

Webb County: Texas Gulf Production 1-B A. M. Bruni est., J. V. Borrego Grant, 7½ mi. SW Aguilares, dry at 5,309 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Apr. 21 crude oil	Distillate, allied products	April PAW quota all oils	Apr. 14 crude oil
Alabama	300	.....	300	300
Arkansas	79,900	5,200	85,200	80,550
California	915,350	58,560	977,360	906,700
Colorado	9,850	.....	10,500	9,300
Eastern	65,650	8,400	76,600	64,050
Illinois	205,600	12,000	217,000	187,600
Indiana	11,600	.....	12,000	11,900
Kansas	273,150	4,300	278,300	268,150
Kentucky	25,500	3,200	35,200	23,400
Louisiana	366,050	40,000	400,000	366,050
North Louisiana	71,050	.....	.....	71,050
South Louisiana	295,000	.....	.....	295,000
Michigan	43,300	700	47,700	53,400
Mississippi	52,400	.....	53,000	52,200
Montana	22,650	300	23,300	22,650
Nebraska	900	.....	1,000	950
New Mexico	104,500	4,900	109,100	104,500
Oklahoma	347,350	28,000	395,500	378,300
Texas	2,170,550	160,000	2,330,000	2,170,550
East Texas	378,100	.....	.....	378,100
East Central Texas	145,550	.....	.....	145,550
North Central Texas	150,000	.....	.....	150,000
Texas Panhandle	90,000	.....	.....	90,000
West Texas	489,500	.....	.....	489,500
Southwest Texas	352,150	.....	.....	352,150
Texas Gulf Coast	565,250	.....	.....	565,250
Wyoming	99,150	3,600	103,600	101,250
Total United States	4,793,750	329,160	5,156,960	4,801,800
Change from previous week	down 8,050			

Total production January 1-April 21, 1945 ..... 527,882,300 bbl.
Same period last year ..... 492,721,561 bbl.

PERMIAN BASIN

Northwest Extension to TXL Pool Is Assured

MIDLAND.—Amerada Petroleum Corp. 1 TXL, Section 7, Block 45, T-1-S, T&P Survey, is an assured northwest extension to the TXL pool in western Ector County. Total depth is 8,070 ft., and it was perforated in the upper pay zone at 7,895-7,904 ft. On a 3 hour and 45-minute drill-stem test, oil came to the surface in 15 minutes. For the next 3½ hours the well flowed 173.88 bbl. of 40° gravity oil. Operator is preparing to perforate casing at 7,295-7,904 ft.

Phillips Petroleum Co. 1-A TXL, first producer from Silurian in Ector County, is drilling ahead at 8,681 ft. in lime. It is 1¾ miles southeast of the Devonian discovery well in the TXL pool. The Texas Co. 1-B Fraser, 1¼ miles southwest of the nearest Devonian production in the TXL field, is drilling below 9,339 ft. in lime after having showed some free oil on a drill-stem test at 9,087-9,339 ft. Shell Oil Co., Inc. 1-A Thomas, ¾-mile northeast TXL outpost, is drilling below 9,547 ft. in shale.

Gulf Oil Corp. 6 Sealy-Smith, north outpost to the Monahans Ellenburger field, showed gas in 20 minutes on a 90-minute drill-stem test through perforations at 5,278-94 ft., the regular Tubb producing horizon. Recovery was 100 ft. of drilling mud, 750 ft. of oil and 150 ft. of salt water. The well showed for a higher pay on a 75-minute drill-stem test at

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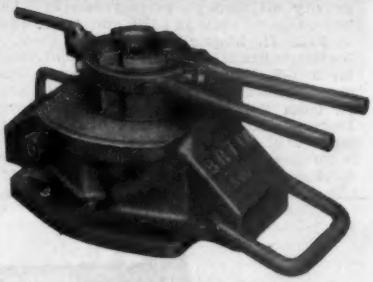

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A CLEAN RIG is a basic "must" for fast, *safe* crew operations. And on all types of wire line operations here's the tool to keep your rig floors free of slippery oil and mud drippings as the wire line is pulled from the hole. Look at these features...

Fully Automatic: The pack off unit automatically locks in place as tools are lowered into well...and automatically releases and rides out on top of tools when struck by rope socket coming out of the hole.

Faster Trips: No need to flag or mark the line... no need to slow down wire line speed when coming out of hole. The Baash-Ross Wire Line Wiper instantly releases when tools strike it, assuring safer *faster* runs!

Quick Inspection: Because the Wiper rides out on top of the tools every trip, swabs and similar tools can be withdrawn and checked *each run*. Far more efficient than non-releasing wiper arrangements!

Non-Sparking: A split bronze bushing in the Wiper prevents wire line from sparking as it passes through tool. An extra Baash-Ross safeguard of vital importance!

The Baash-Ross Wire Line Wiper is available in sizes to fit Line Pipe and Casing 3" to 9". For more details send for special bulletin. Also see page 283 of your Composite Catalog!

BAASH-ROSS
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NO CREW TIME LOST waiting for the right Block to arrive, and no costly Block inventories either when you have a Baash-Ross Utility Block around. Can be used as (1) Floor Block... (2) Bailing Block... or (3) Tubing Block by simply changing accessory equipment...

As a Floor Block it tips 45° any direction against positive stops. Note side-opening feature for quick line threading!

As a Bailing and Coring Block it can be securely hung anywhere on crown block beam. Free-swiveling and tilting features insure proper rope travel at all times.

As a Tubing Block swivel can be locked against rotation by a pin, or left free-swiveling as desired. 78,000 lb. capacity is ample for most work.

Important features include 78,000 lb. working capacity (safety factor of 2)... alloy steel sheaves with flame hardened groove... heavy-duty tapered roller bearings in both sheave and swivel... direct-channel grease lubrication... and many others. A special descriptive bulletin is available ... or see page 281, Composite Catalog!

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FASTER, SIMPLER TUBING JOBS are easy with this Baash-Ross Open End Spider. Requires less set-up time because no connections need be broken. And its unitized slip assembly speeds the actual tubing work as well as safeguards the tubing against damage. Here are the highlights...

1. With the end gate removed, simply slide the Spider into position around the tubing. No need to break connections. End gate can then be quickly dropped back in place and locked with a bolt.

2. Note dovetailed tongues on end gate that fit corresponding grooves in Spider body. These tightly lock the entire unit into one rigid assembly that will not "spread" under even the heaviest loads!

3. And the unitized slip assembly is built for extra speed and efficiency. The four slip segments are locked in permanent alignment—act as a single unit and always grip uniformly!

For more details send for special bulletin. Also see page 282 of your Composite Catalog.

Step up the efficiency of your production operations by installing these Baash-Ross production tools. Your nearest Baash-Ross representative will gladly give complete details on the many ways these tools speed operations, save manpower. Or write direct.

4,948-5,038 ft. It flowed 35° gravity oil at a rate estimated at 50 bbl. an hour 45 minutes after beginning the test. The drill-pipe unloaded 1 hour after the tool was closed. When the drill-pipe was broken down, 1,100 ft. of oil and 100 ft. of salt water were recovered.

Andrews County.—Stanolind Oil & Gas Co. 1-P University, Devonian discovery 3 miles southeast of the Fullerton Devonian field, has been completed for a 24-hour natural flow of 438.16 bbl. of 44° gravity oil through perforations at 8,750-70 ft. Gas-oil ratio is 1,109, and total depth is 8,855 ft. Magnolia Petroleum Corp. 1 Martin, wildcat 2 miles southeast of Stanolind 1-P University, has cemented casing at 8,695 ft. after plugging back to 8,780 ft. from 10,118 ft. It will test the lower Permian lime which indicated production on a drill-stem test below 8,700 ft. Magnolia 1-A Ralph, 1-mile west extension to the Fullerton pool, drilled to 10,771 ft. It has been plugged back to 7,200 ft. after failing to show anything in either the Ellenburger or the Devonian. With 5½-in. casing set at 6,710 ft., the well was washed with mud acid. Two thousand gallons of regular acid was injected. After swabbing off oil load, it yielded 18 bbl. of oil in 8 hours. Swabbing will be continued.

WEST TEXAS WILDCAT FAILURE

Pecos County: G. F. Aldrich 1 Shell-Barnes, Sec. 138, Blk. 140, T&St.L Sur., 5 mi. SE Shearer pool, elev. 2,398 ft., dry, TD 1,835 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Samedan Oil Co. 1 Boyd, 23-22s-37e, 2-mile northwest extension to the Drinkard discovery, Lea County, had gas to the surface in 3 minutes on a drill-stem test at 6,370-6,455 ft., total depth. Oil started flowing in 40 minutes, making pipe-line oil in 48 minutes at rate estimated at 10 bbl. of oil per hour. Five and one-half-inch casing has been set at 6,367 ft., and operator is preparing to test. Stanolind Oil & Gas Co. 1 Jones, wildcat 7 miles southeast of Hobbs, made a 60-minute drill-stem test at 8,283-69 ft. and recovered 1,290 ft. of black sulfur water. The top of the water was cut with drilling mud. There was no shows. It is being drilled below 8,460 ft. in dolomite.

Mid-Continent Petroleum Corp. has staked 1 Annie Christmas 1,320 ft. west of Gulf Oil Corp. 1 Paddock, recent discovery in the Holt zone. It is SE SW 1-22s-37e. A southeast outpost to 1 Paddock is Repollo Oil Co. 1 Alexander Rogers. It is to be drilled 660 ft. from the north line and 1,980 ft. from the east line of 12-22s-37e.

SOUTHEASTERN NEW MEXICO SUCCESSFUL WILDCAT

Lea County: New oil pool—Gulf 1 E. T. Paddock, 1-22s-37e, 2 mi. N Drinkard pool, top pay 5,170 ft. Glorietta, flowed 610 bbl. day through 1-in. choke on 2-in. tubing, perf. 5,200-30 ft., gravity 38.4°, TD 5,843 ft.

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N. CENTRAL TEXAS

Cooke County Wildcat Drill-Stem Testing

WICHITA FALLS.—The Texas Co. 1 W. M. Sowder, T. Toby Survey, wildcat 6 miles southwest of Muenster in Cooke County, recovered 150 ft. of oil and gas-cut mud on a 15-minute drill-stem test at 3,793-3,813 ft. It is drilling ahead at 3,998 ft. in shale and chert. Texas 1 Murrell, T. Ward Survey, 12 miles northeast of Gainesville in northeastern Cooke County, took a 40-minute drill-stem test at 5,444-94 ft. and recovered 120 ft. of oil-cut mud. Electric log was run to 5,494 ft., total depth. Texas 1 Morris, M. Wilkinson Survey A-1089, wildcat 7 miles southeast of Gainesville, is drilling below 4,511 ft. in black shale. Texas 1 Buckeley, W. Holmes Survey, wildcat 15 miles northeast of Gainesville, is drilling below 4,841 ft. in shale.

Clay County.—Continental Oil Co. 1 W. M. Hillin, Section 3290, TE&L Survey, wildcat 4 miles south of Bellevue, on a 35-minute drill-stem test at 6,078-91 ft. recovered 80 ft. of drilling fluid and 30 ft. of light oil-cut mud, but no oil nor water. Bottom-hole pressure was 200 lb. It is drilling ahead at 6,365 ft. in sand. Anderson-Prichard Oil Co. 2-A Wood, northeast of the discovery of the Wood Bend conglomerate pool of northwestern Clay County, perforated with 120 shots at 6,050-80 ft., ran tubing and recovered salt water. Operator is preparing to reperforate. Bridwell Oil Co. 1 Vaughn-Holt Unit, Block 3, J. H. Belcher subdivision, wildcat 5 miles southwest of Blue Grove, drilled hard sand and shale with taste of oil at 4,502-11 ft. and was drilling below 4,756 ft. in shale, lime and sand streaks.

Miller Marine Decking, Inc. has staked 1 William E. Bond, a 6,500-ft. wildcat 10 miles northwest of Vernon in Wilbarger County. It is 467 ft. from the north and west lines of Section 32, Block 16, H&TC Survey.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: D. H. Bolin 2-A J. A. Young, Blk. 2487, TE&L Sur., 4 mi. N Megargel, dry, TD 1,540 ft.

Delbar 1 A. L. Harris, Blk. 58, J. W. Harris subd., 7½ mi. SW Archer City elev. 1,096 ft., dry, TD 1,412 ft.

McCarty & Coleman 1 J. H. Turberville, Blk. 148, Robt. Carson Sur., 7 mi. W and 4½ mi. N Archer City, elev. 900 ft., dry, TD 1,560 ft.

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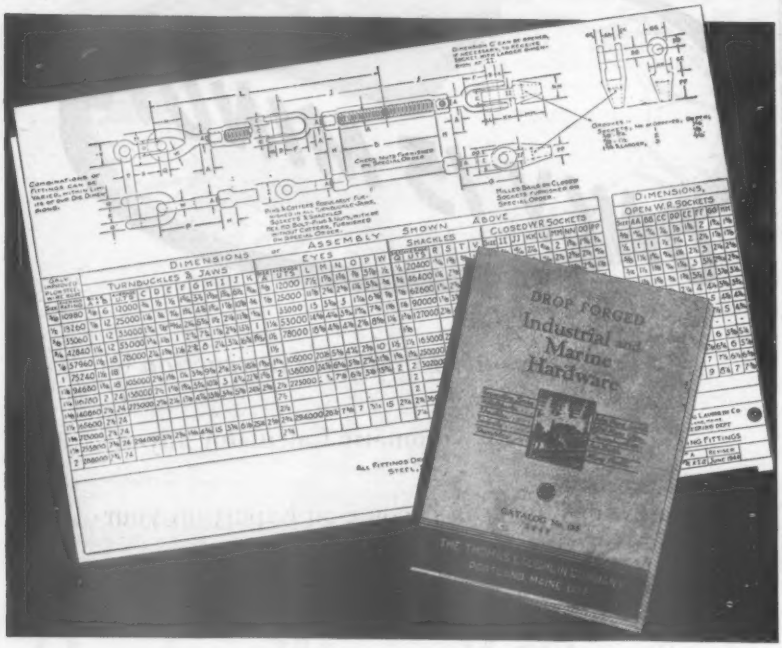

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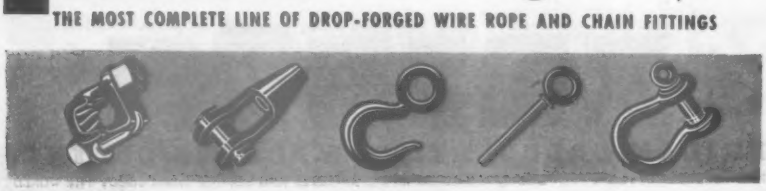

Blk. 2, SP Sur. A-987, 3½ mi. W Holliday, Caddo 4,212 ft., Ellenburger 4,615 ft., dry, TD 4,638 ft.

Young County: Panhandle 1 Thompson, Blk. 2692, TE&L Sur., 2 mi. NE Graham, Caddo 3,849 ft., Mississippi 4,681 ft., dry, TD 4,741 ft.

WEST CENTRAL TEXAS WILDCAT FAILURE

Stephens County: Texas & Pacific Coal & Oil 1 Morrison, Sec. 1026, TE&L Sur., 3 mi. W Ivan, elev. 1,247 ft., Ellenburger 4,632 ft., dry, TD 4,903 ft.

TEXAS GULF COAST

Humble Gives Mayes Field New Producer

HOUSTON.—A new oil producer has been completed in the Mayes field in Chambers County by Humble Oil & Refining Co. Its 4 M. E. Mayes flowed at the rate of 13 bbl. an hour through 3/16-in. choke, tubing pressure 1,250 lb., casing pressure 1,850 lb., gravity 41.4°, gas-oil ratio 1,135. Total depth is 8,215 ft., with perforations at 8,177-69 ft.

In White Lake area, Jackson Pasture outpost, of Chambers County, Standard Oil Co. of Texas 2 Fannie Mae White, in Soloman Brill Survey, was completed flowing 4,413,000 cu. ft. gas daily through ¼-in. choke, tubing pressure 2,975 lb., from 24 perforations at 8,886-92 ft. It flowed an estimated 220,000,000 cu. ft gas daily on open flow test, no gauge made on the condensate. First hole had been drilled to 10,503 ft. plugged back, and completion was made in deviated hole, which has total depth 9,025 ft., with 7-in. casing set to 8,975 ft.

Tide Water Associated Oil Co. is still testing the 1 W. F. Albert, northeast offset to the company's 1 Underwood, discovery well at the Sublime field in Colorado County. Total depth is 9,535 ft. with 7-in. casing set to 9,530 ft. and tests being run in the open hole below the casing. On one test through drill stem, it had shown a flow of 148 bbl. daily through ¼-in. and ⅛-in. chokes with 1,680 lb. working pressure, gas-oil ratio 1,600.

Pan American Production Co. 1-B August Schindler, in A. Becker Survey, Abstract 97, is dry at total depth of 9,075 ft. This failure is 2,446 ft. north-northeasterly from the 1 Williams, discovery well at West Orange Hill field in Colorado County. The dry hole failed to find commercial shows, recovered salt water on a drill-stem test at 8,980-9,006 ft.

Pan American Production Co. is preparing to dual-complete the 1 L. E. Posey, east extension test at the Pinehurst field in Montgomery County. The dual completion will be made in the sands at 9,600 ft. and 11,050 ft. levels. Last test was run in perforations at 9,564-87 ft. and 9,592-9,622 ft. where it flowed at the daily rate of 1,500,000 cu. ft. gas with 75 bbl. straw-colored condensate through ⅜-in. choke, showing maximum tubing pressure 625 lb. The lower zone had previously shown a good flow of gas and condensate. Total depth is 11,820 ft. with 7-in. casing set to 11,266 ft.

UPPER GULF COAST SUCCESSFUL WILDCAT

Chambers County: Gas-condensate discovery—Texas 1-A Josephine Connerly, HT&B Sur., Sec. 92, 5.3 mi. SW Stowell, TD 8,609 ft., perf. 8,397-8,405 ft., PT 2,018,000 cu. ft. gas daily through 12/64-in. choke with 15 bbl. condensate per million cu. ft. gas, tubing pressure 3,075 lb., shut-in. tubing pressure 3,250 lb., gravity 52.9°.

UPPER GULF COAST WILDCAT FAILURE

Matagorda County: Union Oil of Califor-

nia 1 Emma Larsen Graddy, Markham area, in Daniel Etherton League, 3½ mi. W Markham, dry at 9,285 ft.

EASTERN TEXAS

Henderson County Test To Be Acid Treated

DALLAS.—The Texas Co. 1 G. M. Morse, wildcat in the Calderon Survey, 1 mile south of Chandler, Henderson County, perforated with 142 shots at 10,364-386 ft., swabbed, and recovered rich gas odor, but no oil. A 4-hour drill-stem test at 10,048 ft. showed slight blow at the surface for 2 hours. Tool was being pulled and it is planned to use mud acid and treat. Texas 1 Dr. W. N. Sneed, southwest extension to 1 McKnight, recent gas discovery in Freestone County, was drilling below 5,965 ft. in hard lime. Buda was topped at 4,650 ft. Ohio Oil Co. 1 V. Popper, wildcat 2½ miles southeast of Cash, Hunt County, was drilling ahead at 9,050 ft. with no shows reported.

Skelly Oil Co. 1 Sallie Baker, wildcat in Timothy Davis Survey, Panola County, is breaking down drill pipe to run 5½-in. casing. Total depth is 6,500 ft. Pettit was topped at 6,130-52 ft. and showed fair porosity. M. E. Davis 1 Mrs. C. A. Shelby, wildcat in the Thos. Williams Survey, 1 mile northeast of Newsome, Camp County, is dry at 8,264 ft.

Tide Water-Seaboard Oil Co. has staked a 1-mile west extension to the New Hope field in Franklin County. It is 1 E. E. Evers, 415 ft. from the west line and 2,050 ft. from the north line of the J. Barre Survey. Humble Oil & Refining Co. will drill a wildcat about 8 miles east and slightly south of Rusk, Cherokee County. It is 1 S. H. Maness, 14,150 ft. from the west line and 1,600 ft. from the south line, Jose M. Musquez Survey.

EASTERN TEXAS WILDCAT FAILURES

Houston County: Woodley Petroleum 1 L. J. Murray, John Durst Sur., 4 mi. SE Commerce, elev. 170 ft., Woodbine 7,969 ft., dry, TD 8,042 ft.

Shelby County: Mass-Tex Oil 3 Pickering Lbr., Blk. 9, Lot 10, W. J. Crain Sur., 3 mi. NE Shelbyville, dry, TD 3,838 ft.

MISSISSIPPI

Cranfield Has New High-Gravity Producer

JACKSON.—The California Co. 7 Ratcliffe, 67-7n-1w, in the Cranfield pool of Adams County, has been completed flowing 302 bbl. of 39.3° gravity oil in 22 hours, through 5/32-in. tubing choke. Perforations were made at 10,323-350 ft. in basal sand, and 2½-in. tubing was run to 10,320 ft., with packer set at 10,305 ft. Tubing pressure was 1,800 lb. and the gas-oil ratio was 1,300.

In Yazoo County, the Southern Natural Gas Co. 1 Gammill Investment Co., 660 ft. north and 500 ft. west of SE corner of NW 5-9n-4w, a wildcat, was waiting on orders after swabbing salt water and heavy oil at 6,766-78 ft.

In the Gilbertown field of Choctaw County, Alabama, the Hunt Oil Co. 2 Utsey, 33-11-4w, is waiting on pump, after the well was swabbed, but would not flow.

MISSISSIPPI WILDCAT FAILURES

Forrest County: H. I. Morgan-Dilworth Hager 1 Batson-Hatten Lumber Co., SW NW 20-1s-12w, dry, TD 9,748 ft., Comanche 8,610 ft.

Greene County: Humble 1 Stover, 673 ft. south and 435 ft. west of NE cor. of Sec. 20-3n-7w, dry, TD 5,983 ft., in salt.

Holmes County: Sinclair-Wyoming 1 Chisolm, NW SW 10-13n-1e, dry, TD 6,666 ft., Comanche 6,445 ft.

Lauderdale County: M. H. Dees 1 Simmons-Wright Co., 300 ft. south and 250 ft. east of NW cor. of NE SW 4-7n-18e, junked at 1,001 ft.

Smith County: Gulf 1 King, 695 ft. south and west of center of Sec. 8-10n-13w, dry, TD 8,302 ft., Comanche 8,180 ft.

Washington County: O. W. Killam 1 Fisher, NE NE NW 7-17n-8w, dry, TD 7,068 ft., Comanche 5,410 ft.

GEORGIA WILDCAT FAILURE

Echols County: Hunt Oil 2 Superior Pine Products Co., southwest cor. of Lot 317, Land Dist. 13, dry, TD 4,066 ft.

SOUTH LOUISIANA

North Tepetate Well Flowing Gas-Condensate

NEW ORLEANS.—Humble Oil & Refining Co. 1 Smith, 18-7s-1w, at North Tepetate field, Acadia field, Acadia Parish, is flowing 13 bbl. condensate daily through ⅛-in. choke with 1,103,000 cu. ft. gas, about 80 per cent basic sediment. Tubing pressure is 2,500 lb. and the well is flowing through perforations at 8,087-88 ft., with 2½-in. set at 8,031 and packer at 8,022 ft. Operators are still testing.

Sohio Oil Co. is testing for completion in the 2-B Lutcher-Moore Lumber Co., 28-6s-12w, at Mystic field, Beauregard Parish. Well is now flowing at the rate

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of 145 bbl. daily through ¼-in. choke, tubing pressure 1,050 lb., but is showing about 10 per cent salt water. Total depth is 8,600 ft. with 5½-in. casing set on bottom, and 16 perforations at 8,518-24 ft.

Stanolind Oil & Gas Co. 69 State-Black Lake, 18-12s-10w, at West Hackberry field, Cameron Parish, is completed in perforations at 8,776-86 ft., flowing 35.29 bbl. in 2 hours on potential test through 3/16-in. choke, gravity 32.7°, no water, tubing pressure 1,560 lb., gas-oil ratio 834. Total depth is 8,852 ft., with 7-in. casing set to 8,851 ft.

Shell Oil Co. 1 Smith-State Lease 500, Unit 1, 13-14s-6e, deep wildcat in the Week's Island area of Iberia Parish, is still reported washing over stuck drill pipe. Total depth is 14,025 ft., and pipe was stuck at 13,750 ft.

SOUTH LOUISIANA WILDCAT FAILURES

Beauregard Parish: Amerada Petroleum 1 Lutcher-Moore Lumber Co., 23-6s-12w, in Northeast Fields area, dry at 8,549 ft.

Vermilion Parish: Texas Co. 1 Frank LeBouef, 32-12s-3e, in South Abbeville area, TD first hole 11,264 ft., dry at 11,689 ft. in sidetracked hole.

MICHIGAN

New Gusher Completed For Deep River Field

SAGINAW.—Another gusher in Arenac County's Deep River field, and a continuation of the successful development of Isabella County's Coldwater field marked oil-field operations in Michigan in the past week. Completions totaled 10, 3 producers of oil, 1 gas well, 6 dry holes, 4 of which were wildcats.

New drilling spurted, the state Conservation Department issuing 22 permits, 3 each for Osceola and Mecosta counties, 2 each for Isabella, Kent, Montcalm, Bay and Ottawa, 1 each for Muskegon, Ionia, Newaygo, Allegan, Barry and Kalamazoo, numerous wildcatting locations being on the list.

MICHIGAN WILDCAT FAILURES

Allegan County, Dorr Township: Clifford A. Perry 1 Isaac Koster, NE NE NE 10-4n-12w, dry in Traverse limestone, TD 1,770 ft.

Salem Township: Harris Oil 1 Freeman, SW SE NW 30-4n-13w, dry in Monroe, TD 1,790 ft.

Isabella County, Coe Township: Chartiers Oil 1 Gervin Childs, N½ NE NW 29-13n-3w, dry in Dundee, TD 3,633 ft.

Saginaw County, Fremont Township: Shell Oil 1 M. Nelson, NW NW NE 13-11n-2e, dry in Dundee, TD 3,130 ft.

REPUBLIC NATIONAL BANK OF DALLAS

DALLAS, TEXAS

CONDENSED STATEMENT OF CONDITION AS OF MARCH 20, 1945

RESOURCES

Loans and Discounts		$ 81,013,196.00
Banking House		1,860,000.00
Furniture and Fixtures		260,042.63
Stock in Federal Reserve Bank		450,000.00
U. S. Government Securities		74,209,167.41
Other Bonds and Securities		378,752.54
Cash in Vault and with Banks		76,185,269.00
Total		$234,356,427.58

LIABILITIES

Capital	$ 7,500,000.00	
Surplus	7,500,000.00	$ 15,000,000.00
Undivided Profits		1,040,635.32
Reserve for Dividend—Payable April 2, 1945		150,000.00
Reserve for Taxes, Etc.		867,339.98
DEPOSITS:		
Individual	$119,176,031.30	
Banks	69,552,285.72	
U. S. Government	28,570,135.26	217,298,452.28
Total		$234,356,427.58

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

ROCKY MOUNTAIN

Spring Snowstorm Slows Field Operations

DENVER.—Wildcat operations in the Rocky Mountain area were mostly at a standstill the past week due to a heavy spring snowstorm which blanketed the entire area, the snowfall ranging from a foot in less exposed districts to 3 ft. in northern Montana. Two exploratory wells nearing their objectives, the Kerlyn Oil Co.-Carter Oil Co. test on the Sheldon dome, Fremont County, Wyoming, and the Kerlyn-Phillips Petroleum Co. well on the Midway dome south of Salt Creek, were made "tight" holes and no additional information will be released for the present. Continental Oil Co.'s Ida Goodstein, South Elk Basin, is running a liner at 7,166 ft., and completion of this important discovery will be delayed another week. Other wildcats showed no important changes.

Deep test on Lamb anticline.—Hageman, Pond & Hanlon are rigging up in SW 12-51n-93w for a test to the Madison at 4,100 ft. on the Lamb anticline in Big Horn County, Wyoming. This follows the recent sale by the Department of the Interior of leases on 1,549 acres on the Lamb dome and 445 acres on the Torchlight dome, the two highs being separated by 100 ft. of independent closure. Mule Creek Oil Co. (Carter) bid in the Torchlight acreage at $25.60 an acre. A test on the Lamb dome drilled in 1923 had 8,000,000 cu. ft. of gas in the Muddy sand at 1,370-95 ft., but the supply now is virtually depleted. No deep test has been drilled on this high, but a well went to the Madison on Torchlight and had 50 ft. of oil saturated lime at 4,000-4,050 ft., but was drowned out by water. It was located 200 ft. down structure as shown by recent surveys. Torchlight was developed in a shallow sandy zone in the Mowry shale a number of years ago by about 150 wells, but these subsequently were abandoned.

Water in Sundance at South Byron.—Continental Oil Co. 1 Prescott, SE SE SE 9-55n-96w, South Byron wildcat, found water in the Sundance sand topped at 5,524 ft., and is drilling ahead at 5,705 ft. with the Embar and Tensleep as the next objectives.

Utah Southern-Equity Oil at Rangely.—Utah Southern Oil Co., of Salt Lake City, and its affiliate, the Equity Oil Co., report that each has an 11 per cent interest in drilling rights below 2,500 ft. in 6,300 acres in the Rangely field, western Colorado, the remaining 78 per cent being held by the California Co. Two of the California Co. producers, 1 Emerald and

1 McLaughlin, are located on this block. The two Utah companies have shallow production in the field.

LA.-ARK.

Four New Producers Completed in Arkansas

MAGNOLIA.—Arkansas completed four new producers this week, including one condensate well, and has three failures, one a wildcat. The condensate well was located in the Dorcheat-Macedonia field of Columbia County, and was drilled by Phillips Petroleum Co. on the Cloette farm, N/2 SW 18-18-21w. Initial production was 52 bbl. of condensate from the Smackover lime at 8,936-58 ft. Total depth was 9,038 ft.

The three oil wells were located in Dorcheat-Macedonia, Hillsboro, and Stephens field. The Stephens well was dually completed from the zones at 3,946-55 ft. and 3,960-68 ft. The initial yield was 75 bbl. and total depth of the hole was 4,015 ft.

Aside from the completion of a wildcat discovery well, and two gas wells in the Monroe field, all of North Louisiana's completions this week were dry. The discovery well produced 135 bbl. of condensate from the Tuscaloosa at 8,340-70 ft.

ARKANSAS WILDCAT FAILURE

Pope County: Stanolind 1 Maxwell, SE SE 18-8n-18w, dry, TD 4,847 ft.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Concordia Parish: Condensate discovery—California 1 Bennett, 27-9n-10e, 135 bbl. condensate from Tuscaloosa at 8,340-70 ft., TD 9,183.

NORTH LOUISIANA WILDCAT FAILURE

DeSoto Parish: H. C. Owens 1 Dickson, 480 ft. south and 2,349 ft. west of NE cor. of Sec. 23-14n-13w, dry, TD 2,916 ft.

APPALACHIAN FIELD

New Gas Well Completed For Ravenswood District

PITTSBURGH.—In West Virginia, Columbian Carbon Co. completed the test, 778 E. S. Finch, in Ravenswood district, Jackson County, which after shot gaged 1,109,000 cu. ft. gas. From surface elevation 798 ft., the Corniferous lime was 4,910 ft., Oriskany 5,025-5,100 ft., gas 5,050 ft., rock pressure 1,250 lb. 15 hours, total depth 5,108 ft. In Ripley district, after a long interlude, United Carbon Co. is drilling a test, 1,256 Rex Hutchinson, with the Big lime at 1,751 ft., Injun sand 1,862-1,914 ft., and 8⅝-in. casing set at 1,942 ft.

In Harbor Creek Township, Erie County, northwest Pennsylvania, Appalachian Development Corp. has made a location for an interesting test on C. R. Thornton farm. It is east by south of the Trenton test failure near Presque Isle.

In Pocahontas County, Ohio Oil Co. has abandoned the test on Seneca State Park on Browns Mountain anticline in Huntersville district after continuous caving made progress too slow and it was bottomed at 960 ft. It would have been an interesting test as it started below the Oriskany.

In Wyoming County, the scene of much wildcatting, Hope Natural Gas Co. is completing 8,911 Loup Creek Colliery Co. as a gas well gaging 270,000 cu. ft. gas while cleaning out after shot. The Princeton sand was placed at 1,692-1,722 ft. with gas at 1,707-18 ft., Ranevcliff 1,788-1,827 ft., gas at 1,806-26 ft., shot 1,806-26 ft.

NORTH CAROLINA TEST

A wildcat test 5 miles north of Morehead City, N. C., was spudded April 15 and 16-in. conductor was set at 23 ft., followed by 10½-in. protector pipe at 300 ft. Drilling will be rapid in the soft delta deposits, and the best oil possibility is believed to be a sand formation expected at 2,400 ft. The equipment assembled on the floor indicates that the hole is to be cored from top to bottom. It therefore appears that further test drilling in the area is planned regardless of whether or not the test finds oil or gas.

Drilling crews are under the direction of Lewis Geer of Houston, tool pusher for Floyd L. Karsten's Golden Meadow Well Service Corp. The test is being drilled under contract for a group of North Carolina business men who organized a firm known as Coastal Plains Development Co.

KANSAS

East Marjorie Gas Pool Has High Gravity Oil

THE discovery of 38° gravity oil in the East Marjorie gas pool in southern Barber County has raised high hopes of a considerable amount of oil productive structure on the east side of the Marjorie pool. J. M. Huber Corp. 1 Clay, NE SE SW 28-30-13w, made 16 bbl. of oil per hour, with a production of 164 bbl. on a 10-hour test, after acid. Production is from 4,605-09 ft., in the Maquoketa, topped at 4,591 ft. Other tops on the well are Topeka 3,100 ft.,

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Lansing 3,967 ft., Mississippi lime 4,418 ft., Maquoketa 4,591 ft., crystalline Viola 4,609 ft., Simpson shale 4,698 ft., Simpson sand 4,717 ft., and the total depth of the hole is 4,730 ft.

A second possible producer of oil in the East Marjorie area is the Lion Oil & Refining Co. 1 O'Dell, SE SW SE 22-30-13w. A show of oil was encountered in the Maquoketa at 4,566-85 ft., and a five-foot core in the Simpson sand at 4,687-92 ft. showed a slight stain. Operators have set pipe at 4,686 ft., and are coring ahead. This well correlates about 5 to 7 feet lower than the Huber 1 Clay.

In Norton County, Helmerich & Payne 1 Hansen, SW NW 26-5-21w, is swabbing oil from perforations in the top of the Arbuckle. The Lansing was cut at 3,338 ft., and the Arbuckle at 3,653 ft. Perforations at 3,646-54 ft. had 2,800 ft. of fluid in the hole in 3 hours. Operators plugged back and perforated at 3,650-56 ft., and swabbed 5 bbl. of oil per hour. This well is about 2 miles southwest of the Ray pool.

KANSAS SUCCESSFUL WILDCAT

Sumner County: Eldorado Refining 1 Patterson, SE SE NE 23-33-2e, pumped 15 bbl. per day from Bartlesville at 3,263-78 ft., TD 3,287 ft., Bartlesville 3,269 ft., base Bartlesville 3,278 ft., Mississippi lime 3,278 ft.

KANSAS WILDCAT FAILURES

Barber County: Huber 1 Mills, center SW 33-30-14w, dry, TD 4,735 ft., Arbuckle 4,720 ft.

Butler County: Glenn Smith et al 3 Red Ranch, NW NW SE 4-23-8e, dry, TD 2,580 ft., Mississippi lime 2,575 ft.

Skelly 1 Smith, SW SW SE 9-28-5e, dry, TD 3,244 ft., Arbuckle 3,235 ft.

Graham County: Iron Drilling 1 Everest, SE NW NE 32-8-21w, dry, TD 3,808 ft., Arbuckle 3,784 ft.

McPherson County: Barbara 1 Blaine, S/2 NW NW 36-17-1w, dry, TD 2,842 ft., Mississippi lime 2,805 ft.

Republic Natural Gas 1 Ruth, NE NE SW 13-18-1w, dry, TD 2,826 ft., Mississippi lime 2,805 ft.

Sedgwick County: Beech Aircraft 1 Brooks, NE SE NW 36-28-2e, dry, TD 3,347 ft., Arbuckle 3,338 ft.

Woodson County: Rinehardt & Donavan 1 Strockebrand, SE SE SE 27-23-15e, dry, TD 1,560 ft., Mississippi lime 1,467 ft.

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OHIO, KENTUCKY

Gas Well Completed For Northeastern Ohio

COLUMBUS.—General Electric 1 J. C. Holmes, Lot 48, Conneaut Township, Ashtabula County, is the first completion in the extreme northeast part of the state in a number of years. Clinton sand was found at 2,725-2,774 ft. and gaged 592,000 cu. ft. of gas natural.

Ohio Fuel 1 F. G. Shaw, Lot 3, Chatham Township, Medina County, extends the Chatham pool a location to the west. Newbur sand at 2,364 ft. was drilled 3 ft. in, and gaged 576,000 cu. ft. after being acidized.

The Ohio Fuel drilled-in an oil well along the northern rim of the Granger pool in Medina County. Clinton sand at 3,542-3,596 ft. filled up 2,900 ft. and then flowed and swabbed 55 bbl. in two days natural. Well will be shot and completed by the Preston Oil Co.

OHIO WILDCAT FAILURE

Muskingum County, Salt Creek Township: L. C. Moore Industrial Gas 1 Lewis C. Frazee, Sec. 24, Clinton 4,422-4,468 ft., Medina 4,538-4,544 ft., dry, TD 4,546 ft.

EASTERN KENTUCKY

ASHLAND.—An estimated 2-bbl. oil well was the only completion on the reports of operations in the eastern Kentucky field during the week.

Operator Henry Ball completed Well No. 17 on the Kate Sawyer farm in Estill County with an estimated daily production of 2 bbl. of oil.

WESTERN KENTUCKY

OWENSBORO, Ky.—Sinclair Prairie Oil Co. has a 160-bbl. well in 1 F. A. Bradley, 8-N-23, producing from Hardinsburg sand at 2,042-52 ft. and Waltersburg at 1,789-1,806 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Crittenden County: Joe Reznik 1 D. E. Wood, 12 mi. NE of Marion, dry at 970 ft. after penetrating Hardinsburg sand.

Henderson County: Clarence Wood 1 Alec Taylor, 11-P-25, 3 mi. SE of Zion, dry at 2,354 ft. Glen Dean 1,601 ft., Barlow 1,861 ft., Ste Genevieve 2,154 ft., St. Louis 2,345 ft.

INDIANA-TENNESSEE

EVANSVILLE, Ind.—Kingwood Oil Co. 1 G. E. Harrison, 6 mi. southwest of Crossville, Cumberland County, Tennessee, was last reported shut down for orders at about 3,000 ft. No information is given out at the well, which is said by scouts to have some gas indications.

INDIANA WILDCAT FAILURES

Posey County: Fisher Oil Co. 1 Webb, SW SW SW 2-7s-13w, dry at 2,813 ft. Menard 1,795 ft., Glen Dean 2,118 ft., Barlow 2,355 ft., Ste Genevieve 2,678 ft., St. Louis 2,805 ft.

Summary of March Completions*

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	102	51	65	0	†51	0	76	26	0	0	98,800	83
Pennsylvania	297	140	300	22	‡135	8	259	30	0	0	415,800	301
West Virginia	75	8	44	58	9	0	40	33	2	0	213,134	81
Ohio	65	13	439	29	23	5	17	41	2	0	191,401	180
Indiana	29	10	83	5	14	12	11	6	0	0	41,716	33
Kentucky	74	9	477	42	23	13	33	28	0	0	152,873	34
Illinois	126	78	12,023	0	48	3	28	95	0	0	346,390	176
Michigan	70	27	5,418	2	41	0	29	38	3	0	190,395	128
Kansas	150	66	25,565	14	§70	0	13	134	3	0	515,320	261
Nebraska, Iowa, Missouri	3	1	1	0	2	1	1	1	0	0	5,017	6
Oklahoma	207	122	63,443	13	72	3	41	75	87	1	937,515	554
Texas:												
North Texas	132	69	6,558	0	¶63	24	55	32	21	0	349,025	98
West Central Texas	42	17	6,983	3	22	8	12	22	0	0	96,303	45
West Texas	176	144	73,175	1	31	3	27	75	67	4	836,295	459
Texas Panhandle	49	19	2,390	25	5	0	1	47	1	0	159,026	168
Eastern Texas	31	9	1,382	12	10	0	1	2	26	2	218,444	93
Upper Gulf Coast	90	62	12,781	5	23	0	4	9	66	11	614,414	117
Lower Gulf Coast	74	47	6,819	9	18	0	0	8	64	2	493,227	107
S.C. Texas (S. A.)	9	6	309	0	3	0	3	0	6	0	49,620	19
South Texas (Laredo)	58	39	4,886	3	16	1	5	34	17	1	269,437	74
Total Texas	661	412	115,193	58	191	36	108	229	268	20	3,087,791	1,180
Louisiana:												
Northern Louisiana	29	14	2,251	5	10	0	4	9	16	0	156,387	82
Southern Louisiana	57	38	7,844	1	18	0	0	2	30	25	537,252	125
Total Louisiana	86	52	10,095	6	28	0	4	11	46	25	693,639	207
Arkansas	10	6	1,610	0	4	0	0	4	5	1	62,537	31
Mississippi	29	16	1,687	0	13	0	0	8	20	1	179,689	88
Southeastern	4	0	0	0	4	0	0	1	2	1	29,331	23
Montana	19	16	978	2	1	0	6	12	1	0	52,150	71
Wyoming	14	10	4,690	1	3	1	1	6	6	0	58,484	93
Colorado-Utah	1	1	446	0	0	0	0	0	1	0	6,974	23
New Mexico	51	33	7,664	2	16	4	13	21	13	0	178,928	90
California	195	164	43,124	6	25	18	19	112	42	4	849,295	285
Total March	2,268	1,235	293,345	260	773	104	699	911	501	53	8,307,179	3,928
Total February	1,885	1,024	247,725	189	672	102	582	758	400	43	6,764,687	3,875

*Five week ending March 31. Service wells included: †51, ‡130, §1, ¶1.

CALIFORNIA

New Discovery Made Northwest of Del Valle

LOS ANGELES.—The Texas Co. has made a new discovery less than a mile northwest of the San Martinez section of the Del Valle field but the importance of this new field is somewhat obscured as the company has not released any official data regarding the well or its possible significance. The company found some good-looking oil sand at about 2,825-2,900 ft. and this 75-ft. interval is reported to consist of 52 ft. of oil sand having favorable porosity and saturation. After finding this shallow zone, Texas drilled ahead to 3,114 ft. and then backed up to 2,820 ft. where a string of 7-in. casing was cemented. The discovery well is 1 Kern and is located on property leased from Kern Oil Co. which owns fee title and which retained some of the acreage adjacent to the well. Because of the proximity of 1 Kern to other property held under lease by Bankline Oil Co. and Herley & Kelley, it is quite likely that one or more offsets will be drilled immediately.

Superior Oil Co. nas focused the attention of Paloma operators on the north flank of the structure by proving up a greater thickness of oil sand. As a consequence, the Paloma Unit Plan, under supervision of Western Gulf, is preparing to deepen its 61-33 in Section 33-31s-26e, in order to take in more zone.

Standard Oil Co. is still drilling ahead in 58-4 Kahn, a deep test in the Lost Hills field, and is apparently in the same sand section which contained a thin member of oil sand around 8,700 ft. but has not reported coring any additional oil sand.

CALIFORNIA WILDCAT FAILURES

Kern County, Sheep Springs: Trico Oil & Gas Co. 24-2 Trico, 24-29s-21e, bottomed in gray sand, Sheep Springs sand was barren, only minor showings, TD 5,237 ft.

Kern County, Di Giorgio: Richfield 1 Val-

(Continued on page 182)

OKLAHOMA

New Pool in South Garfield County from Layton Sand

SINCLAIR Prairie Oil Co. appears to have a pool opener in 1 Webber NW cor. 28-20n-4w, in Garfield County, 3 mi. from nearest production. It had Layton sand at 4,632-87 ft. and 4,716-25 ft. A drill stem test at 4,717-25 ft. developed 60 ft. of light green oil and preparations were being made for a production test.

The Texas Co. definitely extended the West Marlow pool in Stephens County 1¼ mi. with 1 Sears, C SW NE NE 20-2n-8w. The well flowed 300 bbl. of oil of 36 gravity, corrected, in 16 hours and 10 minutes. Total depth is 6,714 ft., with 7-in. casing set at 6,714 ft.

The promising test of The Texas Co. 1 Warden, SE cor. 17-8n-10w, Caddo County, became a disappointment when a 1-hour and 20-min. drill-stem test developed 1,530 ft. of slightly gas-cut mud, but no oil, and the hole was being plugged. Total depth is 10,334 ft.

The New Garber pool in Eastern Garfield County has its second oil well, Cities Service Oil Co. 1 Carl Ford, NW SE NW 31-23n-3w, which flowed 20 bbl. per hour through ¾-in. choke from Arbuckle lime at 5,292-96 ft. It is a north offset to the discovery well. No. 1 Ford also showed a 17,000,000 cu. ft. gas production from the Wilcox sand, and will be produced from both formations with the consent of the Corporation Commission. The commission has also consented to the dual-completion of Gulf Oil Corp. 1 Pell, NE SE SW 28-6n-10w, Caddo County which produces 80 bbl. of oil from the Medrano sand at 5,636-96 ft. and has a potential of 24,457,000 cu. ft. of gas from the Wade sand at 5,100-78 ft.

The Magnolia Petroleum Co.'s big gasser and distillate producer, in Grady County, 1 Cunningham, C SE SE 33-5n-6w, had not been completed. This well, total depth 10,891 ft., with casing perforated at 10,-879-882 ft., showed a gas production estimated at 95,000,000 cu. ft., with considerable distillate. Leaking pipe caused the running of 9,108 ft. of 8-in. casing, and testing will be resumed this week.

OKLAHOMA SUCCESSFUL WILDCAT

Creek County: Phillips 1 Marchant, SE SW SE 4-14n-7e, flowed 391 bbl. in 21 hours through ½-in. choke, gravity 48°, from Prue sand at 2,850-99 ft., TD 2,904 ft., Checkerboard 1,950 ft., Oswego 2,811 ft., Prue 2,833 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: Perry Browning 1-A Simpson-Fell, SW NE SW 8-5s-1e, dry, TD 1,073 ft., in sand.

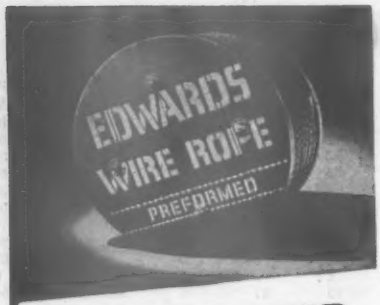
Comanche County: T. H. McCasland 1 School Land, SW SW NE 16-1n-9w, dry, TD 732 ft. in Arbuckle conglomerate.

Cotton County: J. Ben Russell and Fidelity Ray 1 Eckel, NW NW SE 29-4s-9w, dry, TD 2,603 ft., Arbuckle 2,538 ft.

Paul R. Nagle 1 Spencer, SE SE NW 23-2s-11w, dry, TD 2,168 ft., in hard shale.

Logan County: Phillips & Carter 1 Dublin, NE NE 18-15n-4w, dry, TD 7,618 ft., Woodford 6,765 ft., Hunton 6,816 ft., no Bois d'Arc, Sylvan 7,074 ft., Viola 7,169 ft., Wilcox 7,415 ft., second Wilcox 7,580 ft.

Okmulgee County: Stephens 1 Blum, SE NW NW 31-14n-13e, dry, TD 5,396 ft., Wilcox 5,315 ft., second Wilcox 5,390 ft.



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Among the Drilling Contractors

Penrod Drilling Co. is the contractor for Magnolia Petroleum Co. 1 State Block 4B, SW SW 21-3s-15w, Bay County, Florida.

J. L. Perry has the contract for the C. Porter Johnson 1 B. F. Prichard estate, NE NE NW 28-4s-7w, in Tate County, Mississippi.

Camay Drilling Co., Los Angeles, has completed what may prove to be either an extension well in the Del Valle field or a discovery well in a new productive area. Camay has also been given contract to drill a second well in this area in Section 18-4n-17w.

Muskegon Development Co. will drill two wells in Bay County, Michigan, for United Drillers & Producers, Inc. These are the 7 and 8 Maurice A. and Flora B. Arms. The former is in NW NW SW 7-14n-6e, and the latter in NE NE SE 12-14n-5e.

Big Chief Drilling Co. has the contract to drill two tests for Mid-Continent Petroleum Corp. in Cleveland County, Oklahoma. The 2 Jury was rigging up rotary in NE NW NE 26-10n-3w, and the 3 Jury was moving in tools in NE SE SE 26-10n-3w.

Kiowa Drilling Co. is drilling the Derby Oil Co. 1 Rogg, in SE SE SW 7-13-14w, Russell County, Kansas. The test is located 3 miles northwest of Russell and is 1½ miles north of Atherton pool production.

Falcon Seaboard Drilling Co., Houston, has been awarded drilling contract on the Shell Oil Co., Inc., A-2 Dugas & LeBlanc, in 40-12s-13e, Assumption Parish, Louisiana. The well is scheduled to go to 9,000 ft.

A check of drilling under way at Elk Hills shows the following drilling contractors actively at work: **Bell & Loffland, Bender Drilling Co., Buaas Drilling Co., B. M. F. Drilling Co., Brown Drilling Co., Tracy Harkness, K. L. Kellogg, Kent Drilling Co., R. & G. Drilling Co.** Practically all are engaged in multiple drilling.

Universal Drilling Co. has been

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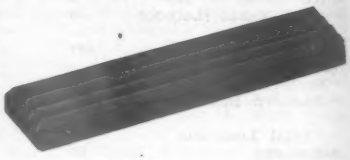

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awarded the contract on the William Moser 1 Russell Dudley, in SE SW NW 2-1n-9w, Barry County, Michigan.

Leland Breckenridge, accountant and tax consultant, has joined the staff of American Association of Oil Well Drilling Contractors. He was formerly associated with the Paul Rutledge and late C. W. Boller interests.

Hollandsworth Drilling Co. has contract to drill the Stanolind Oil & Gas Co. 1 Omohundro, in C NE SW 21-3n-8e, Cimarron County, Oklahoma. The hole will be drilled to around 3,500 ft. with rotary, then carried on down with cable tools.

Simpson & Noble Drilling Co. has the contract on the W. N. Bartlett et al 1 Zahradnik, in SE SE NW 18-15-10w, Ellsworth County, Kansas. Test is a subsurface prospect and is 4 miles north of production in the Stoltenberg pool.

Brewster-Bartle Drilling Co. will drill the Sun Oil Co. and Sohio Petroleum Co. 2 Freeland pool, in SE NE¼ 29-9s-1w, Acadia Parish, Louisiana. Well will go to 10,800 ft.

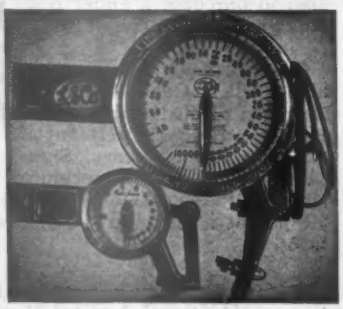
Wampler Brothers, Gladewater, Tex., has the contract to drill the W. I. Nowlin et al 1 Brown Lumber Co., in NW 11-7n-10w, Sabine Parish, Louisiana.

Oil Producers, Inc., will drill on contract the Neil Wagenar 1 Jennie Willink, in SW NW SW 19-4n-15w, Allegan County, Michigan.

Johnson Drilling Co., Cushing, Okla., has the contract, and was clearing site and digging pits for the Deep Rock Oil Corp. 1 Coweta Johnson, in NW NW SE 6-14-8e, Creek County, Oklahoma.

Perry, Busk & Ormiston will drill the Clifford A. Perry 1 Albert Louwsma, in SW SE NE 32-5n-14w, Ottawa County, Michigan.

LINE SCALES



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CALENDAR

May

American Institute of Chemists, Medal meeting, Columbus, Ohio, May 11.

June

Interstate Oil Compact Commission, quarterly meeting, Oklahoma City, June 15-16.

Canadian Gas Association, annual convention, Manoir Richelieu Hotel, Murray Bay, Quebec, June 19-22.

October

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 4-6.

I.P.A.A., annual membership meeting, convention city to be selected later, October 15, 16 and 17.

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PERSONALS

Appointed Drilling Superintendent By Phillips

JIM STEPHENS, production superintendent for Phillips Petroleum Co. in the Central Oklahoma Division, will be promoted May 1 to the position of drilling superintendent, succeeding Doris Ballew who is retiring.

Jim was christened James Page when he was born in Marion, Ind., in 1892. Jim's father was an oil field worker. Jim's earliest memories of sight and smell are of thick crude oozing around the connections of wooden storage tanks.

After roaming the various Mid-Continent oil fields Jim took his first job with Phillips in the Bartlesville district in 1918. From there he went to Ranger, Tex., as a district superintendent. Later he entered the contracting field and ran cable and rotary tools in Texas and Oklahoma for the next 10 years.

When the Phillips Petroleum Co. began bringing in its prolific wells in the Oklahoma City field, Jim was induced to return to the company as assistant superintendent. He advanced to district superintendent, and in August 1936 he became division superintendent of the Central Oklahoma area which includes Ardmore, Seminole, Billings, North Central Texas, Oklahoma City, West Edmond, and isolated areas.

Jim is married and has two daughters and a son.

Charles V. Millikan, chief engineer for Amerada Petroleum Corp., has been elected president of Engineers Club of Tulsa. Millikan received the Lucas Medal from American Institute of Mining and Metallurical Engineers last year for distinguished work in production engineering.

W. C. Clemons, superintendent of production, and **O. H. Carlisle,** division sales manager, have received 40-year service pins from Gulf Oil Corp. in Houston.

Capt. Jay A. Jorgensen, geologist for Phillips Petroleum Co. until he entered war service, has been awarded the Chinese Grand Star of Honor Medal for outstanding and distinguished service to the Republic of China and to the Chinese army. Jorgensen is a graduate of University of Nebraska. He is on duty at a field installation of the Chinese Combat Command.

Dr. Joseph N. Breston, for years a member of the Pennsylvania State College faculty, has joined the production research laboratory staff of Pennsylvania Grade Crude Oil Association at Bradford, Pa. The association has undertaken a $300,000 production research program. Dr. Breston graduated at Pennsylvania State with a B.S. in chemical engineering and later received his master's degree there.

John J. Wilson, formerly stillman of cracking coils at the Bayonne, N. J., refinery of Tide Water Associated Oil Co., has been promoted to night superintendent.

Dr. Simon Miron has resigned as organic chemist in the refinery research laboratory of Lion Oil Refining Co., El Dorado, Ark., to enter private business.

M. M. Rogers, formerly district superintendent in the production department of Humble Oil & Refining Co. at Hobbs, N. M., has been transferred to the Wasson district, Denver City, Tex. His place at Hobbs was filled by promotion of **James S. Little,** formerly assistant district superintendent in the Means district, Florey, Tex. **Carl S. Ham,** formerly assistant district superintendent in the Wink, Tex., district, was transferred to the Means district.

V. A. Brill, geologist and former president of Navarro Oil Co., and **A. M. Cannan,** formerly head of Navarro's land department, have formed a partnership and will open offices as consultants in Houston.

Louis R. Hodell, former chief of production research in the Tulsa laboratories of The Carter Oil Co., returned to civil life recently after more than 2 years of military service and was transferred to Caracas, Venezuela,, as research coordinator for Creole Petroleum Corp.

K. E. Adams, resident geologist at Mt. Pleasant, Mich., for The Texas Co., who has had considerable experience in glider flying, is promoting the organization of a glider club. He and other oil men plan to purchase a glider from surplus government stocks.

Garth L. Young, chief engineer for Signal Oil & Gas Co., Los Angeles, has been elected a director of that company, also vice president and director of its subsidiary, Signal Oil Co. He serves too as technical advisor to the board of directors of the parent company and its subsidiaries.

Martin Shannon was elected a vice president and **Armond Hanson** a director at the annual meeting of Osceola Refining Co., Reed City, Mich. Both men reside in Big Rapids, Mich.

A. E. Watts, executive vice president of Sinclair Oil Corp., was elected a director of Richfield Oil Corp. at the latter company's annual meeting in New York. In 1914 Watts was appointed oil umpire during the days of excess production in the Cushing, Okla., field. His service for the state at that time is said to have prompted formation of the Interstate Oil Compact Commission. At the present time he is a member of several committees of Petroleum Administration for War.

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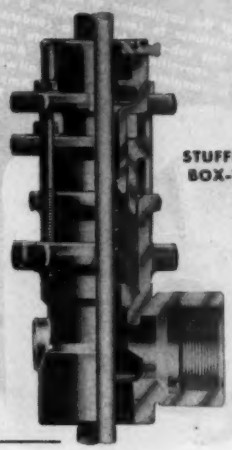

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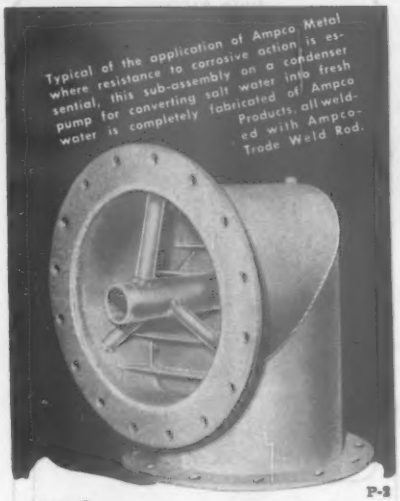
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WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended Apr. 21, 1945					Cumulative total, 1945				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	0	1	1	0	0	5	20	25
Indiana	0	0	0	1	1	2	0	0	6	8
Illinois	0	0	0	3	3	16	0	0	69	85
Kentucky	0	0	0	2	2	2	0	1	13	16
Michigan	0	0	0	4	4	2	0	0	71	73
Kansas	1	0	0	8	9	12	0	6	99	117
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	9	9
Oklahoma	1	0	0	6	7	30	0	4	83	117
Texas:										
North Central	0	0	0	6	6	32	0	3	139	174
West	0	0	0	1	1	18	0	0	84	102
Panhandle	0	0	0	0	0	0	0	1	3	4
Eastern	0	0	0	2	2	5	2	0	27	34
Gulf Coast	0	0	1	4	5	22	1	11	78	113
Southwest	1	0	0	4	5	8	1	3	52	64
Total Texas	1	0	1	17	19	85	5	18	383	491
Louisiana:										
Northern	0	1	0	1	2	1	1	2	20	24
Southern	0	0	0	2	2	11	0	0	14	25
Total Louisiana	0	1	0	3	4	12	1	2	34	49
Arkansas	0	0	0	1	1	0	0	0	15	15
Mississippi	0	0	0	6	6	3	0	0	38	41
Ala., Ga., Florida	0	0	0	1	1	0	0	0	8	8
Montana	0	0	0	0	0	4	0	0	5	9
Wyoming	0	0	0	0	0	6	0	0	10	16
Colorado-Utah	0	0	0	0	0	0	0	0	3	3
New Mexico	1	0	0	0	1	5	0	2	18	25
California	0	0	0	8	8	0	0	2	60	62
Total United States	4	1	1	61	67	179	6	40	944	1,169
Total previous week	12	1	2	62	77					

CANADIAN FIELDS

Clearwater-Ram River Well Tests Production

CHATHAM.—In the Clearwater - Ram River area in the northern Alberta foothills, Ram River Oils 3, LSD 12, 1-37-11w5, bottoming at 5,642 ft., has started definite production test of 300 ft. of Devonian limestone. Good porosity and oil saturation is indicated at 5,552-5,621 ft. Lime will be acidized if swabbing does not show satisfactory production. Ram River 4 is rigging.

Conrad.—In the Conrad field, southern Alberta, Mid-Continent Oil & Gas Co.-East Crest Oil Co. 2, LSD 7, 8-6-15w4, TD 3,191 ft., has set 7-in. above the Ellis after drill-stem test showed 40 ft. of oil and drilling fluid, with a tight sand. Mid-Continent-East Crest 3, LSD 1, same section, is drilling. California-Standard Co. Conrad-Province 7-4-A, LSD 4, 4-6-15w4, at 2,944½ ft. showed 500 ft. of oil on drill-stem test and is being placed on production.

California Fields

(Continued from page 177)

ley Agriculture, 9-31s-30e, bottomed in basement material, no showings, TD 1,506 ft.

Jasmine: Rothschild Oil 1 Nunes, 25-25s-27e, bottomed in gray sand, no showings, TD 2,050 ft.

Antelope Hills: Mohawk Petroleum 1-18 Layman, 18-28s-20e, bottomed in gray sand, form. test 1,178-1,250 ft., recovered all water; form. test 1,111-26 ft., recovered sulfur water with trace of oil; form. test 863-873 ft., recovered sulfur water; form. test 635-650 ft., recovered sulfur water, TD 1,371 ft.

Los Angeles County, San Jose Hills: Continental 1 Bayly, 29-1s-9w, bottomed in volcanics, basement, no showings, TD 4,007 ft.

Madera County, Firebaugh: L. R. Lytle 1 Burkhart-Greer, 35-12s-16e, bottomed in Cretaceous gray sand, Kreyenhagen 4,020 ft., Nortonville 4,211 ft., Domengine 4,235 ft., drill pipe stuck, could not recover, no showings, TD 5,600 ft.

San Luis Obispo County, Huasna: Amerada 1 Tar Springs, 25-32s-14e, bottomed in hard shale, no showings of importance, TD 5,440 ft.

Yolo County, Dunnigan Hills: Texas 1 Salisbury, 20-10n-1e, gas prospect hole, bottomed in hard shale, only minor showings, Capay shale 2,993 ft., TD 7,163 ft. Another test has been started in Section 12-10n-1w, indicating continued interest in district.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, Washington, D. C. Notice is hereby given that the E½SE¼ sec. 24, T. 24 S., R. 36 E., N.M.P.M., New Mexico, 80 acres, within the known geologic structure of the Cooper-Lynn oil field is offered as a single parcel to the responsible qualified bidder of the highest cash bonus per acre for lease under section 17 of the mineral leasing act, as amended by the act of August 21, 1935 (49 Stat. 674, 30 U.S.C. sec. 226). Sealed bids will be received in the office of the Commissioner of the General Land Office, Interior Building, Washington 25, D. C., up to twelve noon, May 7, 1945. Each bidder must submit a certified check or cash for one-fifth of the amount bid payable to the order of the Treasurer of the United States and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental at the rate of $1 per acre must be paid, and a $5,000 corporate surety bond must be furnished by the successful bidder prior to the issuance of the lease. The deposits of the other bidders will be returned upon acceptance of the successful bid by the Secretary of the Interior. The envelopes should be plainly marked "Bid for lease, Cooper-Lynn oil field, New Mexico. Not to be opened before noon, May 7, 1945." No bids received after the hour fixed herein for submitting bids will be considered. The successful bidder will be required to agree not to discriminate against any employee or applicant for employment because of race, creed, color, or national origin and to require an identical provision to be included in all subcontracts. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.